GAS

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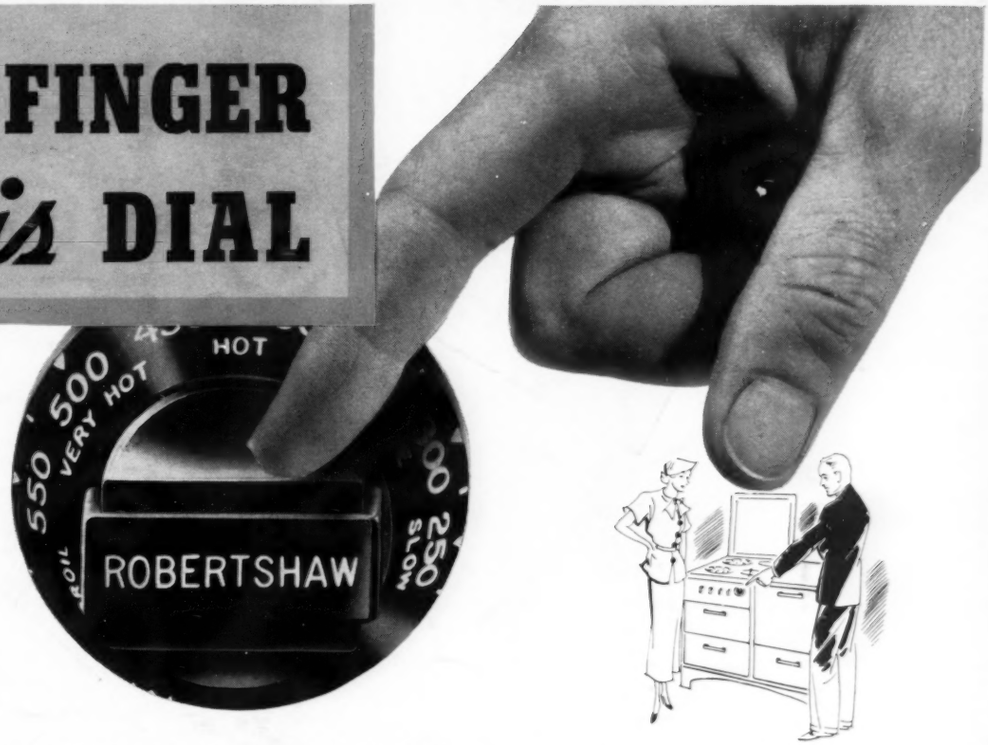

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American Gas Association national advertising now *tells* your customers about MODERN GAS COOKERY . . . this dial helps you *sell* it! • Have salesmen point to the dial – have them point out that Robertshaw oven-heat-control is the *big* feature that makes cookery modern. • Accurate control of temperature – perfect control over meat shrinkage – freedom to leave the kitchen – these are the time-saving, work-saving features that women will *understand* as modern. These are the features that Robertshaw provides. • Sell Robertshaw-equipped ranges. Be sure the dial is *marked* Robertshaw. Over 16 years of advertising have made that name stand for modern cookery. This year it's the name that helps you *sell* modern cookery.

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OVER 2,600,000 IN USE

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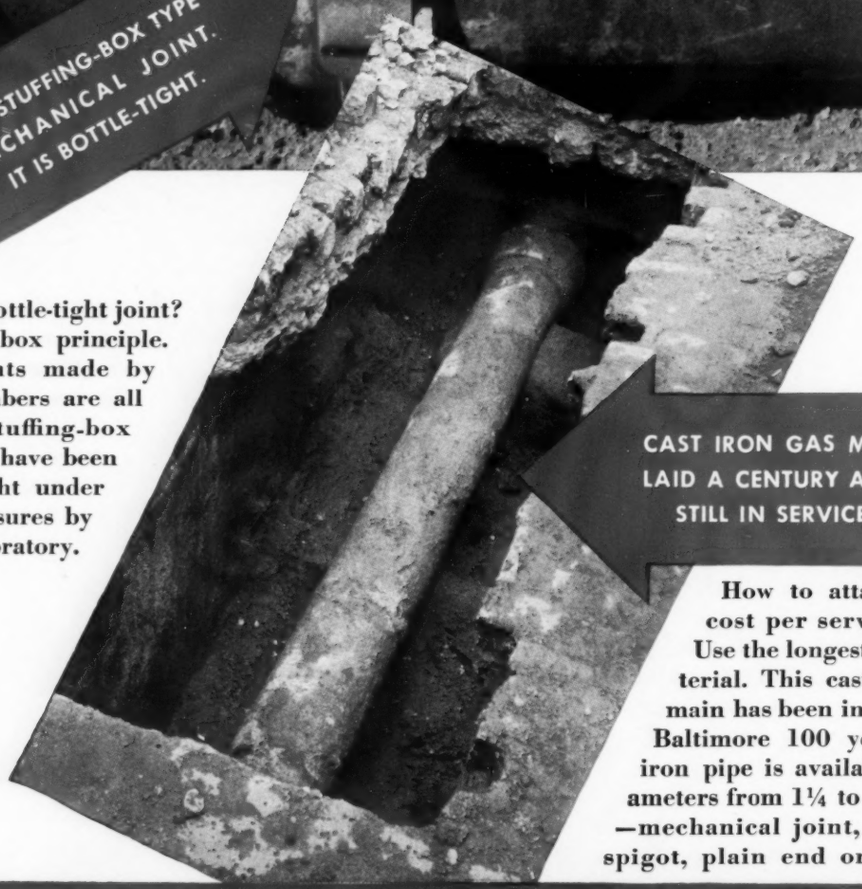

How to attain lowest cost per service-year? Use the longest-lived material. This cast iron gas main has been in service in Baltimore 100 years. Cast iron pipe is available in diameters from 1¼ to 84 inches —mechanical joint, bell and spigot, plain end or flanged.

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GAS

FORMERLY WESTERN GAS

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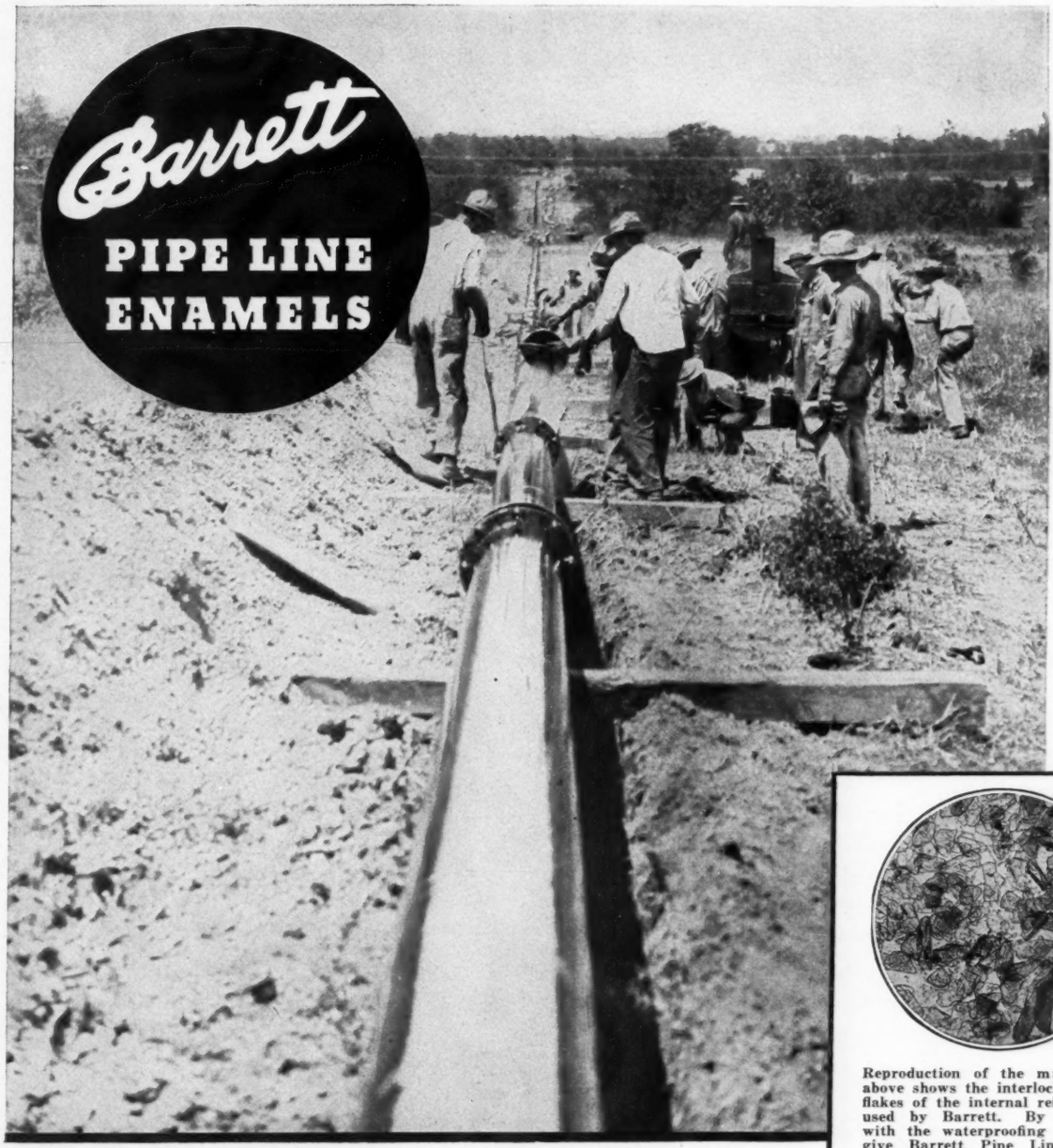
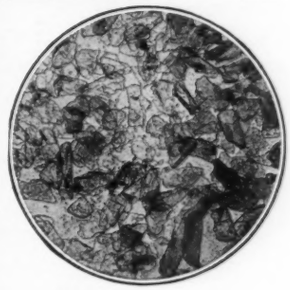
It costs less to prevent corrosion than to repair or recondition lines



Courtesy United Gas Public Service



Reproduction of the micrograph above shows the interlocking of the flakes of the internal reinforcement used by Barrett. By laminating with the waterproofing agent they give Barrett Pipe Line Enamels unusual toughness and resistance to soil stresses.
For Pipe of large diameter, The Barrett Company will furnish equipment required to revolve pipe and spread enamel.

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Barrett Pipe Line Enamels provide a tough dielectric coating that resists soil stresses and increases the useful life of the pipe—saves money in the long run.

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Gas lighting is on its way back! The load that gave the industry its first big start again holds glorious opportunities for development now that new modern design equipment is available for merchandising effort.

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These and other new Gas Lights — modern and beautiful, more efficient, more convenient than was ever thought possible—now provide equipment for every lighting need. Write today for complete literature and selling information.

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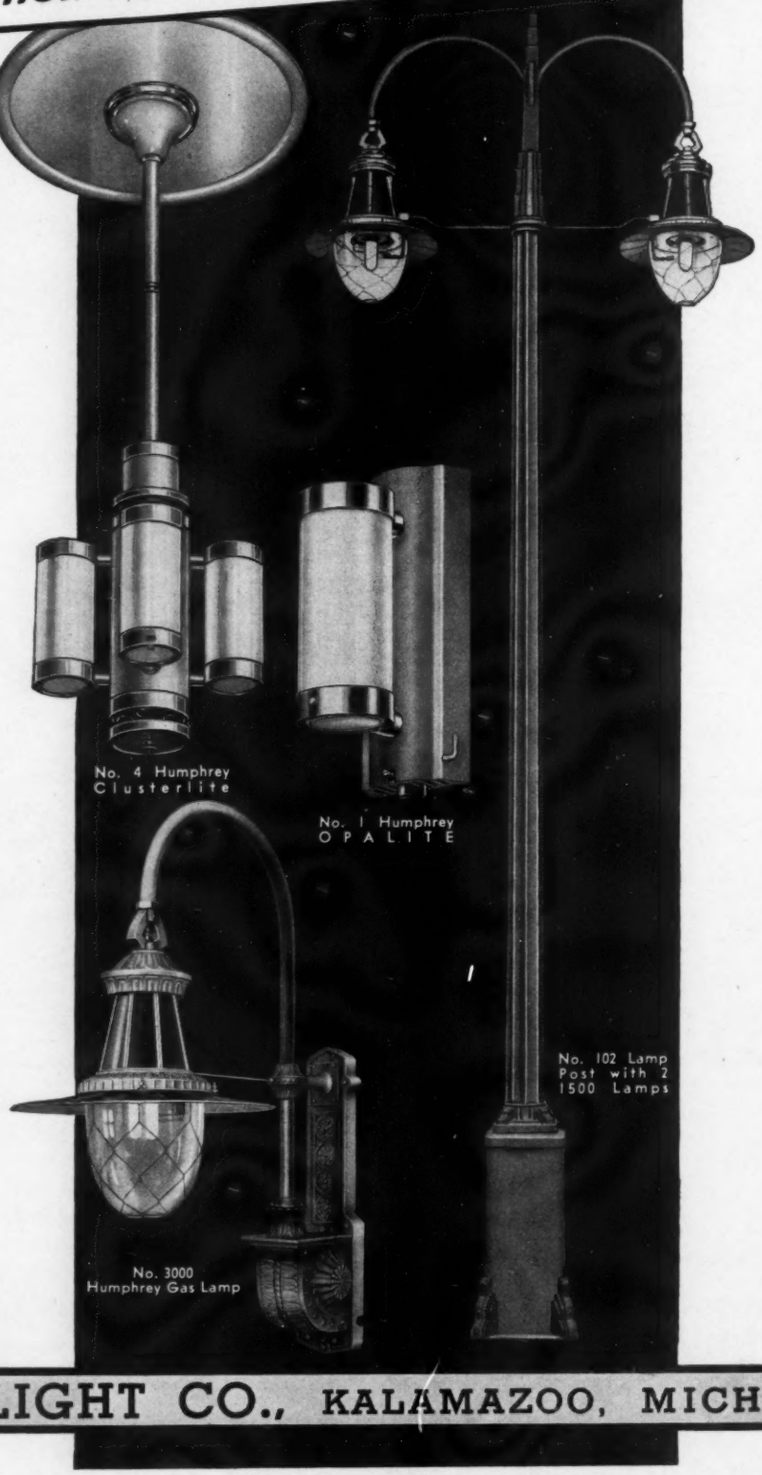

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DAYTON

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Incorporating the same simplicity of design and construction as other types of Dayton couplings. This group of Service Fittings is recommended where permanence and flexibility are required.

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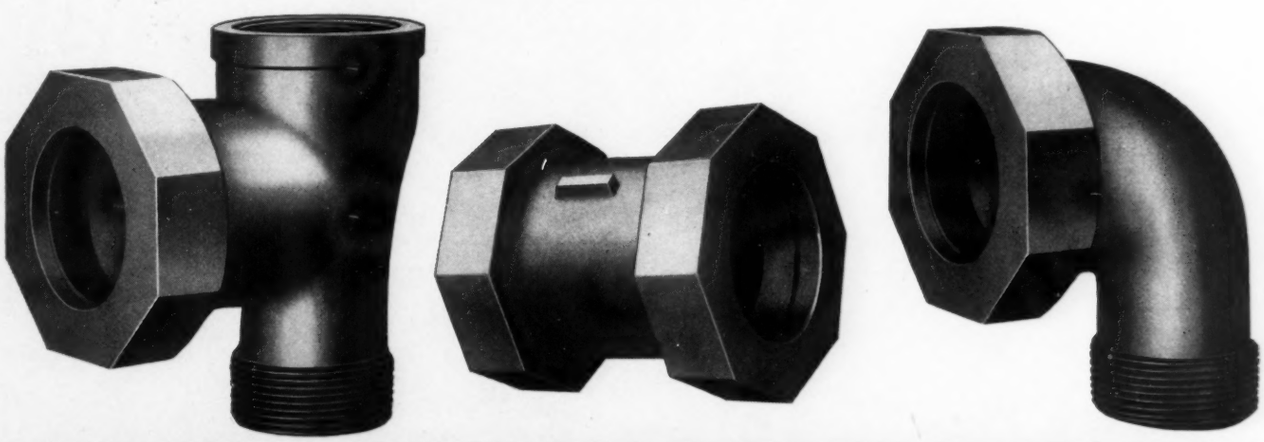
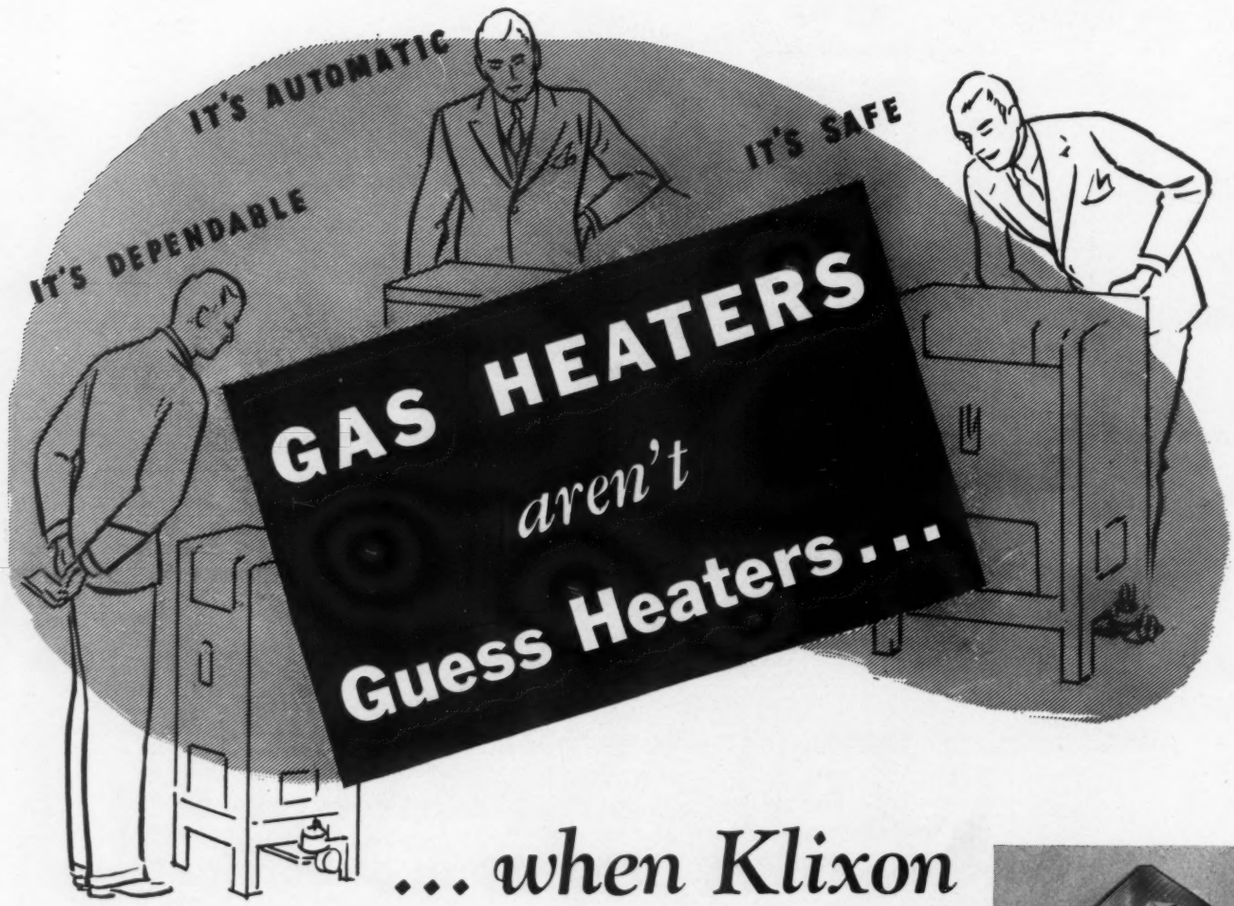


THE NATIONAL SUPERIOR CO. DAYTON PIPE COUPLING DIVISION
DAYTON · OHIO



. . . when Klixon All Gas Controls are used

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Klixon controls are snap-acting. They're small and compact, accurate and dependable, economical and simple, and can be easily applied to practically any heater.

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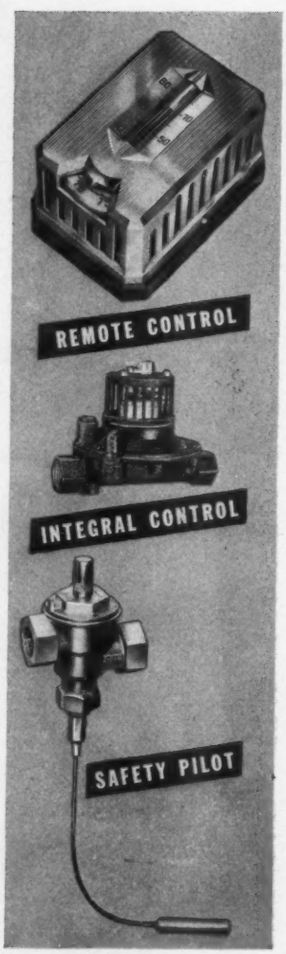

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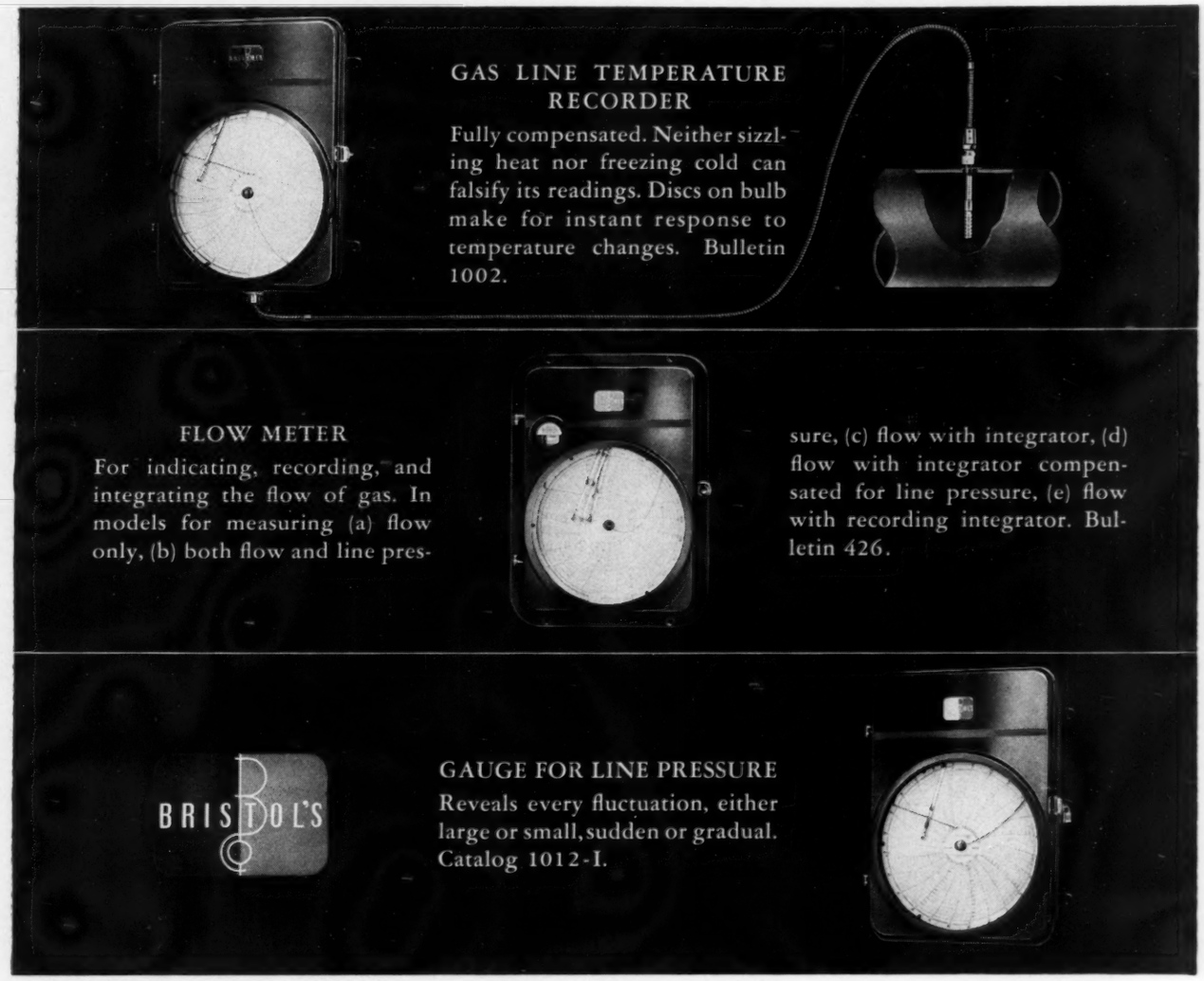
These BRISTOL'S are *"fussy"* about your service



GAS LINE TEMPERATURE RECORDER

Fully compensated. Neither sizzling heat nor freezing cold can falsify its readings. Discs on bulb make for instant response to temperature changes. Bulletin 1002.

FLOW METER

For indicating, recording, and integrating the flow of gas. In models for measuring (a) flow only, (b) both flow and line pressure, (c) flow with integrator, (d) flow with integrator compensated for line pressure, (e) flow with recording integrator. Bulletin 426.

GAUGE FOR LINE PRESSURE

Reveals every fluctuation, either large or small, sudden or gradual. Catalog 1012-I.

WHEN you enlist these three guards to stand watch over your service, you know what is happening,—*always*. There is no need or reason to guess. What better way to promote good service, build good will and protect customer satisfaction?

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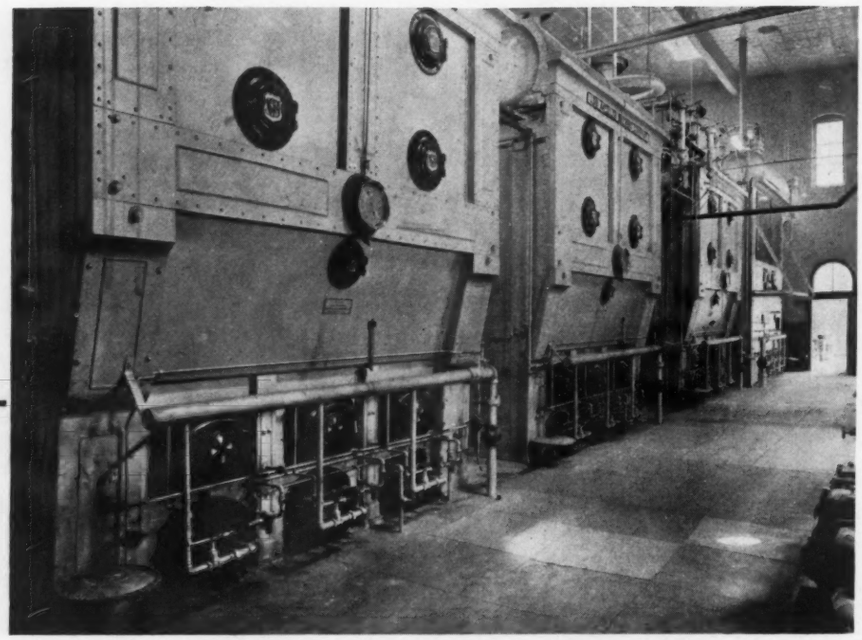
PIONEERS IN PROCESS CONTROL SINCE 1889



GAS + SERIES 100 BURNERS = SATISFIED INDUSTRIAL CONSUMERS

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N.G.E. BURNERS SERIES 100

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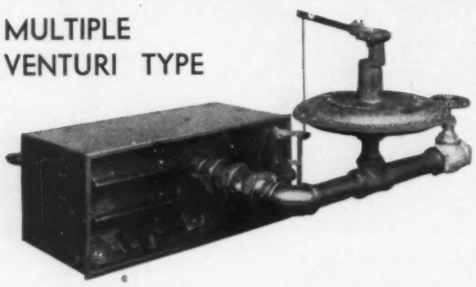

N.G.E. Series 100 Gas Burner with draft control regulator, providing automatic and accurate control of both air and gas. Series 100 operates efficiently with gas of any commercial BTU content at any pressure from a few inches water column to 8 pounds. Orifices of correct drilling are supplied to suit gas make-up, pressure and firing conditions.

EVERY requirement for high combustion efficiency and correct heat application can be fully realized by the selection of N.G.E. Series 100 Burners. In Series 100 are combined all advantages of both multiple jet type and venturi type burners. This combination in one compact unit obtains high combustion efficiencies at low operating pressures, and affords high ratings with minimum draft in limited combustion space.

As illustrated above, the N.G.E. Series 100 has been primarily designed for installation in large gas-fired steam boilers, stills, etc. Scores of operating records reveal that measurable economies have been effected by plant operators where supposedly serviceable, yet extremely wasteful, equipment was replaced by these efficient burners. The Series 100 N.G.E. Burners will more than fulfill every demand for efficiency within sensible limits.

N.G.E. engineers have successfully cooperated with plant engineers in applying these burners to varied installations. Write for further information on their application to your particular problems or for Bulletin describing the engineering and operating details of this N.G.E. multiple unit venturi type burner.

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Announcing
THE GREATEST CIRCULATING HEATER EVER USED IN A GAS RANGE

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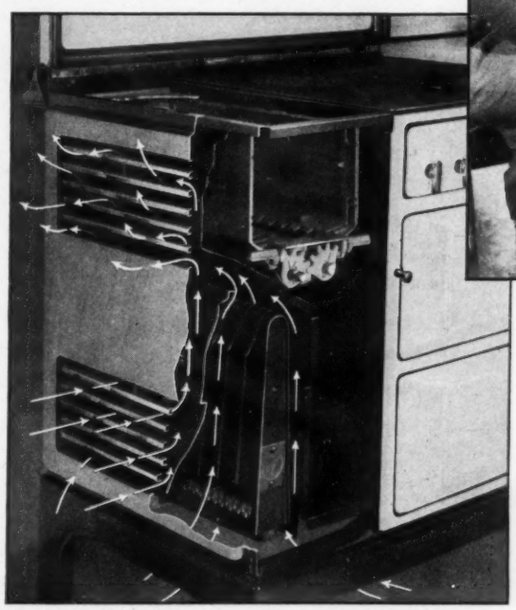
marches on!
and carries the banner for GAS!

●WEDGEWOOD'S new Table Top models with Gas Circulating Heater* will *sell*—and they'll sell more *gas*. Exclusive advantages of this new Wedgewood Heater: automatic safety lighter—Gas Heating Unit full porcelain enameled—a design that provides the utmost heat for amount of gas consumed. *PATENT APPLIED FOR

Table Top Range

●SHOWN BELOW is a cross section of Wedgewood's All-Season Masterpiece No. 2022 BK CT. For the *first time* your customer gets a perfected Gas Circulating Heater plus a full-size firebox. Note the construction that provides for greater intake of cold air—both from the bottom and through the lower grate.



2022 BK CT. Table Top Kitchen Heater Range

●WEDGEWOOD'S All-Season Masterpiece Models No. 2045 CT (Closed Top) and No. 2085 OT (Open Top) shown above, are equipped with Gas Circulating Heaters. Clean, healthful, instantaneous kitchen warmth . . . and the same perfect cooking qualities that have made Wedgewood's Masterpiece Models the outstanding modern gas ranges!

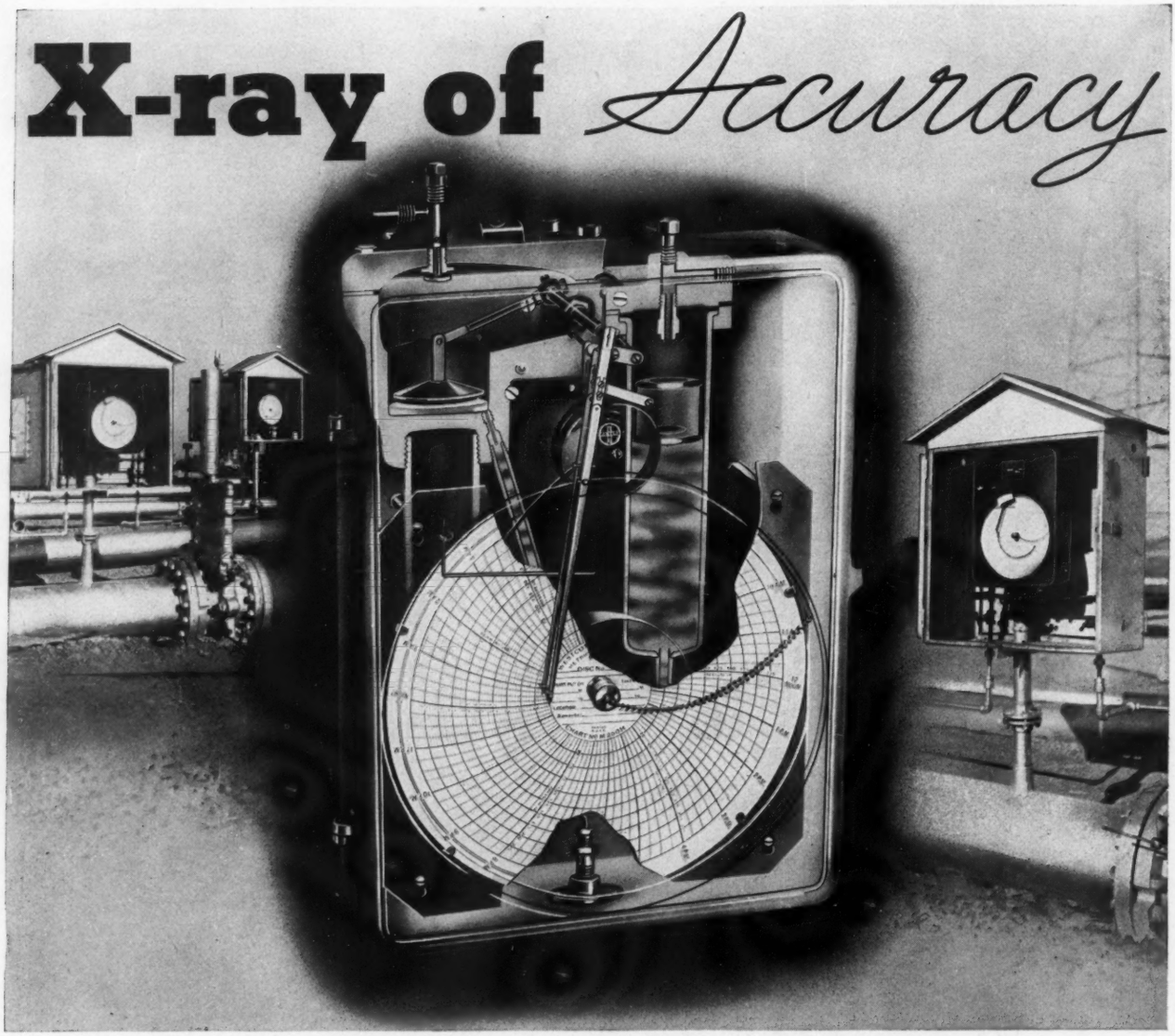
A.G.A. Approved

WEDGEWOOD *The Modern Gas Range*

WINS FRIENDS FOR GAS

JAMES GRAHAM MANUFACTURING COMPANY · San Francisco · Los Angeles · Newark · Portland

X-ray of *Accuracy*



EXAMINE WHAT IT IS that makes Westcott orifice meters appeal to the man out in the field . . . the meter engineer who sees the difference between instruments in terms of the number of adjustments and the maintenance necessary to **KEEP** them accurate!

Notice the **SIMPLICITY** of Westcott meters . . . There's only one moving part between the surface of the mercury and the chart record.

Note too the large float area, with wide clearances eliminating loss of accuracy due to dirt collecting on the mercury . . . the low angle of travel of the float . . . and the small angular travel of the static tube. They make the Westcott meter a **PRACTICAL** instrument, insuring not only accuracy but ruggedness and complete reliability.

There are a score of minor refinements as well, all of which come under the heading of good instrument making . . . including accurate machining and honing. Meter men take them for granted in Westcott meters . . . but without them the most advanced features of design still could not produce a Westcott meter.

New literature gives complete data. It will be mailed on request. Also, information on the new popular Round Case Indicating Flowmeter.

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Measurement and control of Gas, Oil, Steam, Air and Liquids
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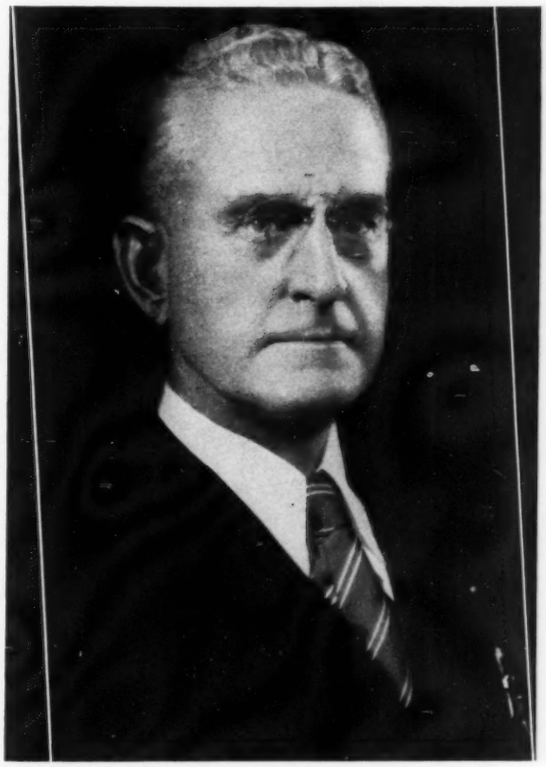
GAS
September, 1936

Guest Editorial



Detroit Is READY for Natural Gas

By WILLIAM G. WOOLFOLK
President, Detroit City Gas Company

THIS issue of *GAS* has been designated as the Detroit Souvenir Edition, signalizing the entrance of natural gas into another of the Nation's first-rank population areas and industrial centers,—the City of Detroit together with more than 30 neighboring communities. It seems pertinent, therefore, to set forth in this editorial preface, some of the factors surrounding gas service in this area—for Detroit City Gas Co. operates under a set of conditions which in many respects is unique. Not all of these governing conditions have come into being as a matter of course; some are the deliberate work of management in earlier company history. More recently the gas service structure has been reexamined in the light of modern demands and of approaching natural gas service. As a result, a plan* has been shaped under which Detroit's gas service may go forward in exact step with public benefits from that service.

Here, then, is a running commentary upon the Detroit situation, past and present:

For the past 13 years our Company has operated without an ordinance contract between the City and Company; no effort has been made in that time to renew its ordinance contract, nor is the Company desirous of effecting a renewal.

Since the Company's rates are not under the jurisdiction of the Public Utilities Commission, by Michigan Supreme Court verdict the Company has sole right to fix its own rates, subject only to review by state courts as to their reasonableness. In the past four and one-half years domestic rates have been lowered once and raised once; industrial rates have been shifted several times to meet competitive conditions. As long ago as 1905 a sliding scale industrial rate was invoked, starting at 80 cents and ranging downward to 50 cents, for manufactured gas. Gas men in Detroit take justifiable pride in the industrial pioneering done in this area, where the bulk of the motor industry's fuel needs have been supplied with manufactured gas. Steel treating —food products—cosmetics—drugs—whatever the product, gas has had a part in its creation.

Gas management in Detroit is highly localized. Of the Company's nine directors only one is non-resident. Only three are from the management staff. Though a wholly owned subsidiary of one company which in turn falls within another company's corporate structure, the Detroit City Gas Co. pays no holding company fees. Five-ninths of its voting control is in the hands of men who are neither officers of the Company nor connected with the holding company. The Board is a working Board, each of its members taking an active interest in every problem as it comes up for solution.

So much for background. In preparing for natural gas the Company took certain basic steps which it is felt have strengthened and stabilized its position for the future. Elements of the "Detroit Plan" are already known to many in the industry. In brief, the Plan, while not providing for participation by City or customers in management or financial policies, aspires to throw Company and customers into a close partnership, measured by that most exacting of measures—division of earnings. Cash dividends will be declared to customers, above a set base earning. To institute this dividend payment at the earliest possible date the Company has voluntarily waived its participation in any excess earnings during the first year of natural gas service.

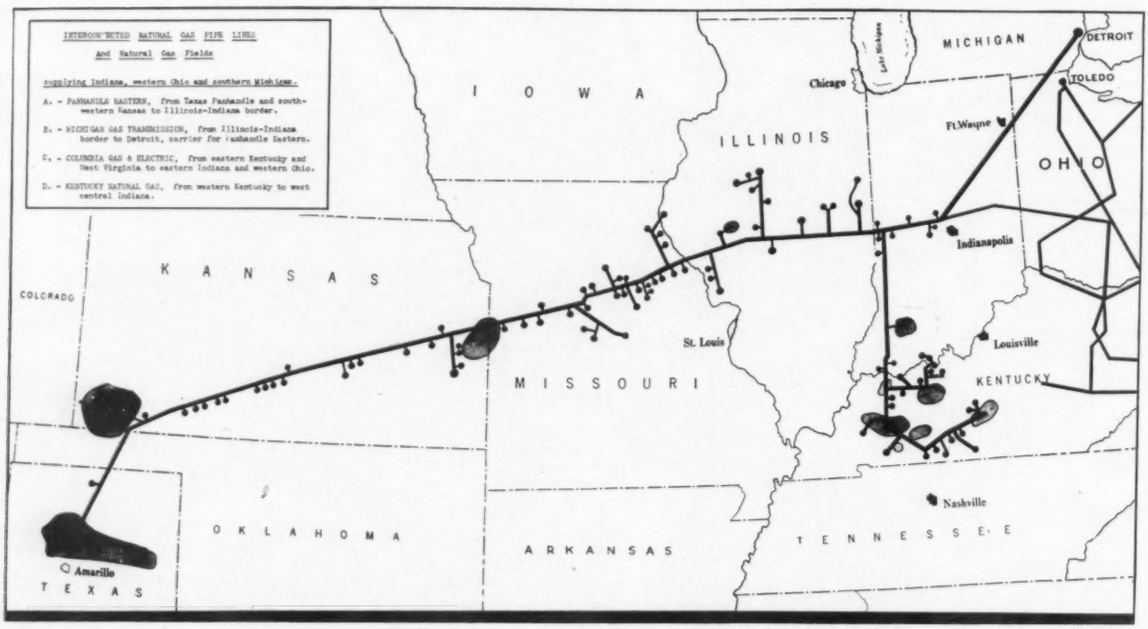
Not the least important phase of the "Detroit Plan" is the fact that it is designed to afford an automatic and flexible means of rate adjustment, and to remove the usual grounds for rate litigation.

As a part of the natural gas promotion it has been determined to "package" the Company's service in a unit readily understandable by the customer. Since 530 B.t.u. gas has been the basis in Detroit for many years, the newly coined "Detroit Gas Unit" consists of 530,000 B.t.u.

While promulgating promotional rates as an essential of the change to natural gas, the Company has, however, protected its revenue structure during the interim period of load building by a minimum payment plan. This plan sets as the minimum payment for each customer, the amount of his bill for the corresponding month of the year preceding natural gas service.

There is no intention on the writer's part to herald these steps taken in Detroit as a cure-all for the ills to which utility companies are heir. Nevertheless, the new conditions of gas service have been entered upon with full regard to fundamental relationships between a public service company and its customers, as we understand them. We confidently believe that the steps which we have taken represent a strong framework around which to build even a greater gas service in Metropolitan Detroit.

*Those interested in a detailed discussion of the "Detroit Plan" may consult the January 1936 issue of this publication, Page 9.—*Editor.*



THE PIPE LINE PROJECT

Special Problems Surmounted in Bringing 230-Mile Detroit Line to Completion on Schedule

CLOSING the gap between Detroit and existing natural gas transmission facilities, Michigan Gas Transmission Corp. has put the finishing touches to 230 miles of new line delivering gas into Detroit City Gas Co.'s distribution system. The new unit is the final link in an 1,100-mile system originating in Texas Panhandle fields.

During the Detroit extension's construction 2,000 pipeliners were spread across 14 counties in Indiana, Ohio, and Michigan. This 22-inch project represents the largest item in recent natural gas construction, and finds its terminus in the largest community to use natural gas on a straight basis. As related in a separate article of this Detroit Souvenir Edition, the city officially introduced natural gas into its change-over district No. 1 on July 9.

Background of Project

The completing link in the project extends from Zionville, Ind. to Melvindale, Mich. where it connects with the Detroit City Gas Co.'s system.

Detroit has been the focal point for numerous proposed projects, but it remained for Michigan Gas Transmission Corp., formed by Columbia Gas & Electric Co., and Panhandle Eastern Pipe Line Co., to bring the task to completion. Facts leading to natural gas being available in Detroit are interesting to review.

Early in January 1930, Missouri-Kansas-Pipeline Co. acquired considerable acreage of gas lands in the Texas Panhandle. The company planned to bring gas to eastern markets and set in motion an active campaign of lease purchasing, at the same time inaugurating an intensive fuel survey.

On September 1, 1930, Columbia Oil & Gasoline Co., subsidiary of Columbia Gas & Electric, bought a half interest in the project. At about this time the Missouri-Kansas Pipeline development was transferred to Panhandle Eastern Pipe Line Co., formed for the purpose. The enterprise then came under the joint operation of the two interests.

A 24-inch line to Rockville, Ind. was completed in 1931. Even at this date an extension of the line to Detroit seemed a certainty. Indiana Gas Transmission Corp., a subsidiary of Columbia interests, completed a 20-inch line from Muncie to Rockville in 1931, tying it into the Panhandle Eastern line. The former terminus of the Columbia system had been at Muncie.

With the signing of contracts in the fall of 1935 between the transmission interests and the Detroit distributors, Michigan Gas Transmission Corp. was formed to construct and operate the 230-mile line to Detroit. Indiana Gas Transmission Corp., was merged into the new corporation.

The Detroit line takes off from the former line of Indiana Gas Transmission Corp. at Zionsville, about 11 miles north of Indianapolis. From there it runs northeastward to Melvindale on the outskirts of Detroit.

Bids Let in March

When gas contracts were signed in 1935, the largest pipe line project of recent years was set in motion. An aerial survey was made. Surveyors staked and plussed the line at every farm line fence, every road fence and at 200-foot intervals along the course. Securing right of-way began. Complete sets of specifications were issued, February 1936, to contractors expecting to bid on the job. Fifteen contractors entered bids. Four of these were Detroit firms interested only in the portion of the line falling in Michigan. Bids were opened on March

15 and 16. Contracts were issued 10 days later.

The Bibb Contracting Co. of Dallas was awarded the contract for constructing the Southern and Central sections of the line. Each of these districts approximates 87 miles in length. They include the Indiana and Ohio portions of the line. United Engineers & Constructors of Philadelphia was the successful bidder on the Northern section, representing approximately 59 miles and including all of the construction work in Michigan.

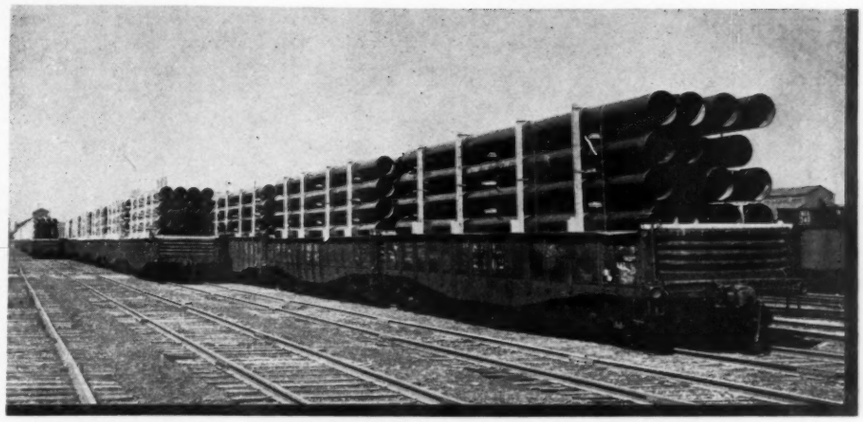
The main line was constructed for 600-pound pressure. The pipe is 22-inch O.D., 5/16-inch wall seamless steel weighing 72.383 pounds per foot. It was milled at the Lorain plant of National Tube Co. The seven multiple river crossings are of 12¾-inch O.D. seamless steel pipe, 65 pounds to the foot.

The line in Indiana and Ohio is of composite construction, two joints electric welded then Dresser coupled. In Michigan the line is entirely coupled except in the instances where sandy, caving soil is encountered. Here it is composite. Dayton couplings are used in Michigan.

Crane Venturi-type 22- by 16-inch steel valves, located approximately every 8 miles, control the line. Pressure can be relieved on any section of the line at any time by means of a 6-inch blowoff located on either side of each valve. A 6-inch bypass also extends around each valve.

The entire line except the south 20 miles in Michigan and the north 20 in Ohio is coated with enamel.

Cleaning and priming paints and enamel were supplied by Wailes Dove-Hermiston and Standard Oil of New Jersey. The pipe going into the unprotected portion of the line was oiled at the mill to prevent rusting. Other pipe is mill-primed, field-primed and hot-coated.



Some of the 22-inch pipe which went into the Michigan Gas Transmission Corp. line, on cars at National Tube Co.'s Lorain mills.

At the commencement of construction on the southern end of the line the ground was so wet and soggy that it was necessary to pull the trucks over the right-of-way with number 60 Caterpillar tractors. The going was also so heavy at times that a load had to be restricted to 40-foot lengths. Random lengths ran better than 42 feet per pipe on the average.

Ditching gangs had hard and slow going, a great deal of caving ditch being encountered. Number 48 Buckeye ditchers were in service in constructing the ditch. Clam shell shovels were used to clear the trench of caving dirt when necessary. Hand labor graded the bottom of the ditch and removed loose soil not removed by clam shells.

Side cutters were used on trenching machines where caving sides were encountered, making the trench wider at the top than at the bottom and taking weight off of the sides of the trench, thus helping to prevent caving.

Toward the north end a great deal of sandy soil was encountered, some of this being quicksand. Badly caving sand necessitated digging the trench to greater depth in some cases. Mostly hand labor was used through the sandy stretches and it was not possible to dig the trench very far in advance of the pipe-laying crew.

As an indication of how sand slows up construction, the contractors on the North were reduced in footage from 4,000, 5,000 and 6,000 feet per day to 1,200 and 1,400 feet per day when the sand was encountered.

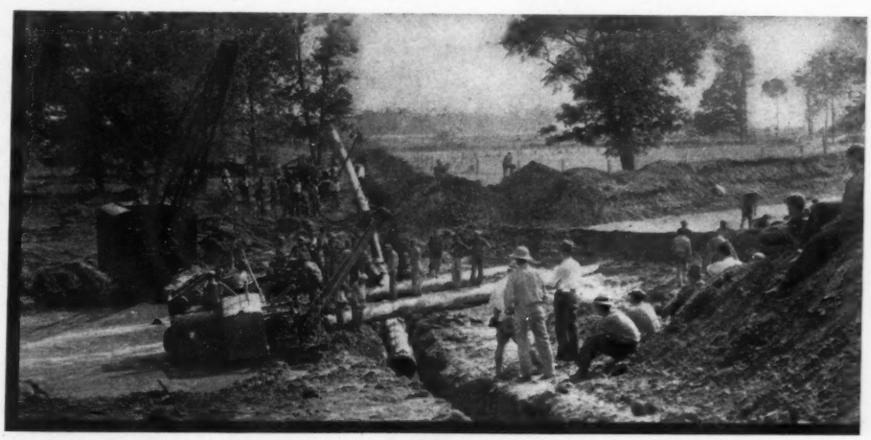
Drainage tile, draining the farmland the entire course of the line, also provided a problem. The ditch, 32 inches wide and averaging 5 to 6 feet in depth, had to be extended to extra depth in places on account of the tile. All tile broken through had to be replaced.

Where the size of pipe broken into was not greater than 4, 5, 6 and 8 inches in diameter it was replaced with transite pipe. Larger sizes than this were replaced with regular clay pipe. Transite offers the advantage of being procurable in 8-, 10- and 14-foot lengths. It can also be cut with an ordinary saw. Transite does not have to be supported above the trench with a trough, as does the regular clay pipe.

It was not unusual on the line to encounter tile at 40- to 60-foot intervals over territory several farms in extent.

Seven rivers are crossed by the pipeline—the Mississinewa, Wabash and St. Mary's in Indiana, the Maumee and Tiffin in Ohio, the Huron and Raisin rivers in Michigan.

Four 12-inch lines running from headers on either bank cross these rivers. The headers are electric welded and are strapped and bolted to a concrete pier. Shut-off valves are located on either side of the river on each of the 12-inch lines to permit shutting the line off in the case of an emergency. A blow-off valve is located ahead of each gate valve to relieve the pressure of the river



In Indiana and Ohio composite construction was used—two joints electric welded, then Dresser-coupled. This section is being lowered in under difficulties, due to necessity for water diversion.

At the Raisin River solid rock bottom was encountered. It was necessary to erect a coffer dam and dynamite trenches through the rock.

Another view of the Raisin River coffer dam operation, showing four 12-inch river lines in place after trench dynamiting had been completed.

In Michgan the line was entirely coupled, except where sandy, caving soil was encountered. Dayton couplings were employed in the Michigan sections.

lines when necessary. A drip connection is installed at each header permitting the draining of any fluid that might accumulate.

The river lines are buried at least 2½ feet below the bed of the river and are protected against corrosion in the same manner as the land pipe.

The Raisin River in Michigan, being of rock bottom at the point of crossing, necessitated the construction of a coffer dam and the dynamiting of trenches through the rock formation. Other river crossings presented no more than the usual problems.

Compressor Facilities

In carrying gas to Detroit at adequate pressures, Panhandle Eastern has found it necessary to greatly augment its compressor station capacity. Details of station design are fully covered elsewhere in this issue, the following being merely a summary of the new and existing compressor station facilities.

Originally, compressor stations were located at Liberal, Kans., Louisburg, Kans., and Glenarm, Ill., with a total compressor capacity provided by Cooper-Bessemer engines of 14,000 H.P. Two additional Cooper-Bessemer units of 1,000 H.P. each are being added at the Liberal station, bringing its total capacity to 7,000 H.P. A natural gasoline plant and a dehydration unit will also be constructed at the Liberal station.

The current year will see the completion of additional stations at Sneed, Texas, the base of the line, at Greensburg, Kans., Haven, Kans., Olpe, Kans., Houstonia, Mo., Centralia, Mo., and Pleasant Hill, Ill. Two Cooper-Bessemer units of 1300 H.P. will go into the plant at Sneed, Texas and three 1300 H.P. Cooper-Bessemer units each at Greensburg and Haven, Kansas. Three 1300-H.P. Worthington engines will be installed at Olpe, Kans, and at Centralia, Mo. Four 1300-H.P. Worthingtons will be installed at the Houstonia, Mo. station and two 1300-H.P. Worthingtons at Pleasant Hill, Ill.

Another station will be constructed next year at Tuscola, Ill. Two 12-inch lines are also to be laid across the Mississippi River at Louisiana, Missouri, at some future date to supplement the line now crossing the river on the Champ Clark Highway bridge.

Michigan Gas Transmission Corp. is constructing a station near Montezuma, Ind., to be called the Wabash station. Two 1300-H.P. Worthington engines will go into this station. The company is to build another station next year at Zionsville, Ind., according to present plans.

The Fluor Corporation of Los Angeles has the construction con-

STANDING BESIDE Michigan Gas Transmission Corp.'s new meter station are the following (reading left to right):

George T. Bentley, asst. to supt. of mfgr., Detroit City Gas Co.; Cecil Van Gundy, Michigan Gas Transmission Corp.; G. S. Young, gen. mgr., Michigan Gas Transmission; Henry Fink, supt. of mfgr., Detroit City Gas; L. E. Ingham, asst. supt., Michigan Gas Transmission; William R. Fraser, chief chemist, Detroit City Gas; J. E. Overbeck, measurement eng., Columbia G. & E., in charge of constructing meter and regulator station for Michigan Gas Transmission.

tract at the Liberal, Greensburg, Haven and Olpe, Kansas stations. Other stations on the Panhandle line are being constructed by the Arthur G. McKee Co., of Cleveland. A. M. Lockett, Inc., has the construction contract for the station on the Michigan Gas Transmission Corp., line at Montezuma.

Measurement and Control

In the meter and regulating stations being constructed by Michigan Gas Transmission Corp. are seen outstanding examples of advanced engineering in the field of measurement and control. The metering station is going up on property provided by the Detroit City Gas Co. and its River Rouge plant at Melvindale, while the regulator station is being erected approximately 5 miles down the line. Construction was started on these stations in April.

Pipe was laid and coupled up one joint at a time in this soggy ditch. Tractors were used to pull trucks over the right-of-way.

The lot assigned to the metering station is 200 feet by 120 feet, the main building having a frontage of approximately 42 feet and a depth of 14 feet with two wings on each corner, extending back approximately 30 feet to form a U-shaped building.

Entering this lot from the east, the 22-inch pipeline connects with a 12-inch bypass extending comlpetely around the measuring station. The bypass permits shutting down the station without disrupting service. Inlet and outlet ends of the bypass are equipped with 12-inch Merco Nordstrom plug valves and a 12-inch orifice flange which will permit measuring any gas which might be required to bypass the station.

The main line inside of the bypass connects to a 22-inch header located underneath the ground at main line depth. Six 10-inch orifice meter runs connect with the header and extend east to west through the building, each meter run having 10-inch risers to proper height in the meter room.

Inlet risers are equipped with Crane steel gate valves. A second 22-inch header is located on the outlet side of the station, the outlet risers being equipped with Merco Nordstrom lubricated semi-steel valves.

Orifice flanges on the six 10-inch orifice meter runs are located inside the meter room. This room is also equipped with all necessary measurement instruments for obtaining flowing pressures as well as recording thermometers to record temperature of flowing gas. Adequate testing instruments such as dead weight guages, pressure monometers, certified glass stem thermometers, etc., are housed in the same room.

A special 10-inch orifice meter run will be used to test the six commercial orifice meter runs. Piping between this test meter run and the six commercial meters is arranged so that any one or more of the six commercial meters can be tested in series with the special meter run.

All of the metering equipment including the six commercial meters and the one special test meter are designed and constructed so as to be in complete agreement with the recently published Report No. 2 of the A.G.A. Gas Measurement Committee.

In the room which will house the Thomas Recording Calorimeter there will also be housed a manually operated Junkers type calorimeter. The laboratory will consist of laboratory desks and equipment suitable for conducting necessary tests for specific gravity, water vapor content, etc.

The outlet side of the station connects with the pipe system of the Detroit City Gas Co.

A foreman and three men will operate the station upon completion. One man will be on duty at all times. The duties of the men include keeping a continuous watch on measurement instruments, changing charts and turning the meter runs on and off as required. The men will also operate the regulator station located 5 miles away. This will require periodic trips to the station in a company car permanently located at the meter station for the purpose.

Main piping at the regulator station consists of a 22-inch main line entering the regulator station, connecting with a 12-inch bypass which permits shutting down the station if necessary.

Inside of the bypass the main line connects to a 22-inch header located at main line depth. The line is equipped with 22-inch gate valves. Four 8-inch risers feed from the inlet header into a 22-inch outlet header. The risers are equipped with 8-inch Crane steel valves and Emco high pressure balanced valve regulators. *(Continued on Page 27)*

DEHYDRATION PLANT

Atmospheric and Butane Refrigeration Cycles Used to Cool Brine in Panhandle Eastern Unit

By HENRY N. WADE
Parkhill-Wade, Inc.
Los Angeles, California

THE absorption gasoline plant now being built for the Panhandle Eastern Pipe Line Co. near Liberal, Kan., will contain as an integral part of the plant a gas dehydrating system of a new type, designed to meet rather special operating conditions not hitherto encountered.

The gas transmitted in the main pipe line originates from wells in the Texas Panhandle and around Hugoton, Kan. The location of the new plant, on the discharge side of the Liberal compressor station, was chosen because it is the first point on the system at which the combined gas from the two fields can be treated under maximum line pressure. This location is in a comparatively warm climate, but the line ultimately delivers gas as far north as Detroit, where line temperatures during the winter run seriously lower than at the plant site. This condition calls for an unusual degree of dew-point depression of the gas at the plant, in order to protect the colder parts of the system against internal corrosion, freezing or hydrate formation at all times.

From past operating records a careful study was made of line temperatures to be expected at the coldest point, which, up to the present, has been at the intake of the compressor station at Glenarm, Ill. The graph of actual temperatures at this point was compared with a graph of weather-bureau records of maximum wet bulb temperatures near the plant site. From this comparison it was determined that during the most unfavorable period, which occurs in June, it would be necessary to artificially cool the gas in the line contactors to a temperature about 10°F. lower than the temperature which could be attained by a water-spray atmospheric cooling tower, in order to prevent condensation or hydrate formation. The system uses concentrated calcium chloride brine as a dehydrating agent; the gas is dehydrated to the required dew-point by contacting it counterflow with an externally cooled and refrigerated stream of the brine.

The contact between the gas and the calcium chloride brine is accomplished in the top section of the absorbers. Bubble cap plates of conventional design are used for this contact. A special scrubbing section is interposed between the top of the oil absorbing section in each absorber and the brine contact plates; a similar scrubber is installed above the brine contact plates to remove from the outgoing gas all traces of entrained brine droplets. The wet gas entering the base of the combination absorbers is thus treated for extraction of gasoline vapor, scrubbed, dehydrated, again scrubbed, and finally delivered from the top of the absorbers dry and free of all entrained liquids, ready for delivery to the transmission line.

In order to reduce the temperature of the final contact between the brine and the gas to a point sufficiently low to reach the desired dew-points in the outgoing gas, it is necessary to remove considerable heat from the gas leaving the tops of the gasoline absorbing sections in the absorbers. This removal of heat is accomplished by circulating a large volume of externally cooled brine through the brine contacting sections. Since the brine flows down through these sections, counterflow to the rising stream of gas, the contactor section acts as a heat exchanger, so that the gas leaving the contactor has a moisture content corresponding to its last contact with the fresh cold brine entering the top of the contactor.

The dehydration system consists, then, essentially of the contacting sections in the tops of the absorbers, external cooling facilities for removing from the brine the heat absorbed by it from the gas, and an automatically controlled evaporator for removing from the brine the water absorbed by it from the gas, thus maintaining the concentration or solution strength of the brine circulating through the system at a constant value. In order to secure the required ultimate contact temperature, the facilities for cooling the brine consist, first, of atmospheric cooling sections mounted in a spray type cooling tower, and second, of a refrigeration cycle utilizing butane-propane mixtures as a refrigerating medium.

Referring to the flow sheet, Fig. 1, one of the contactor sections is indicated at (1). The fresh cold concentrated brine enters the top of this section and flows down through the bubble plates to the base of the section in the conventional manner. The outflow of brine from the base of the section is controlled by means of the float operated level controller (2). This float control delivers the brine through a collecting header to the suction of the main brine circulating pump (3), which raises the pressure of the brine stream by an amount sufficient to overcome frictional and hydrostatic pressure drops through the rest of the brine circulating system.

The pump delivers the brine first to the atmospheric cooling sections (4), where its temperature is reduced to within about 5° of wet bulb temperature under normal operating conditions.

The cool brine from the atmospheric cooling sections then passes to the refrigeration exchanger (5), where its temperature is further reduced approximately 15°F. to the final temperature desired in the contactors. The cooled brine then passes from this exchanger back to the tops of the contactor sections.

The shell side of the refrigeration exchanger is connected thermo-syphon to a surge tank (6), where vaporized butane-propane is separated from the liquid, the vapors passing out of the top of the tank to the suction of the butane vapor compressor (7). The compressor raises the pressure and temperature of this vapor to such a point that it may be readily condensed in atmospheric cooling sections (8).

The liquid condensate from the condenser then passes through expansion back pressure valve (9) back to the surge tank (6).

The water absorbed by the brine from the gas is removed from the brine, and the concentration of the brine in the main circulating system is therefore kept constant, through the operation of the balance of the equipment shown on the flow diagram.

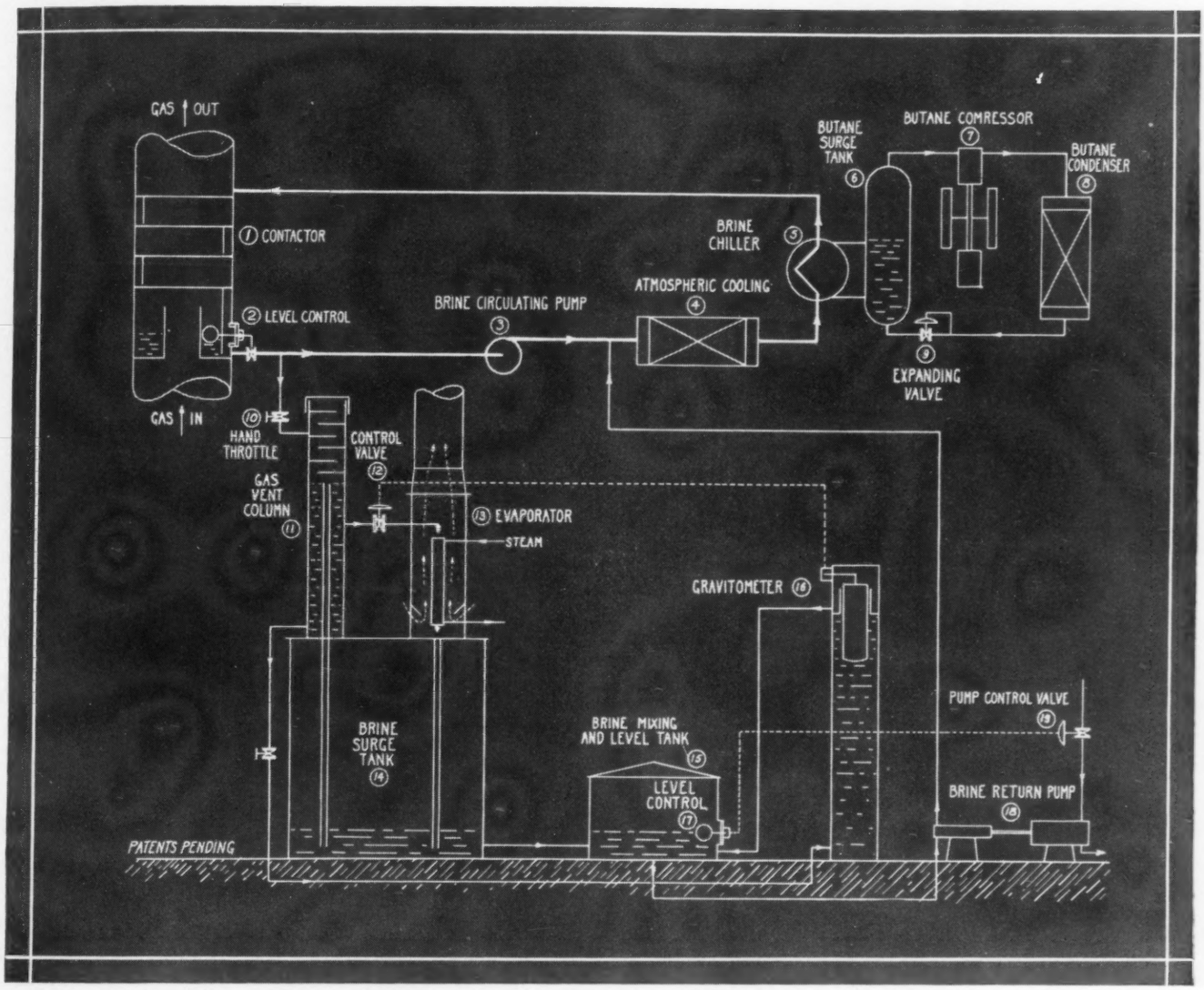


Fig. 1. Flow sheet of Panhandle Eastern's dehydration plant.

A small side stream of brine is withdrawn from the main circulating system through the hand-controlled throttle valve (10). This side stream of brine is first delivered to the gas vent column (11), where dissolved fixed gases are vented to the air. The vent column is elevated sufficiently to permit delivery of brine from it, partially to the evaporator (13) through diaphragm control valve (12), and partially to gravitometer (16).

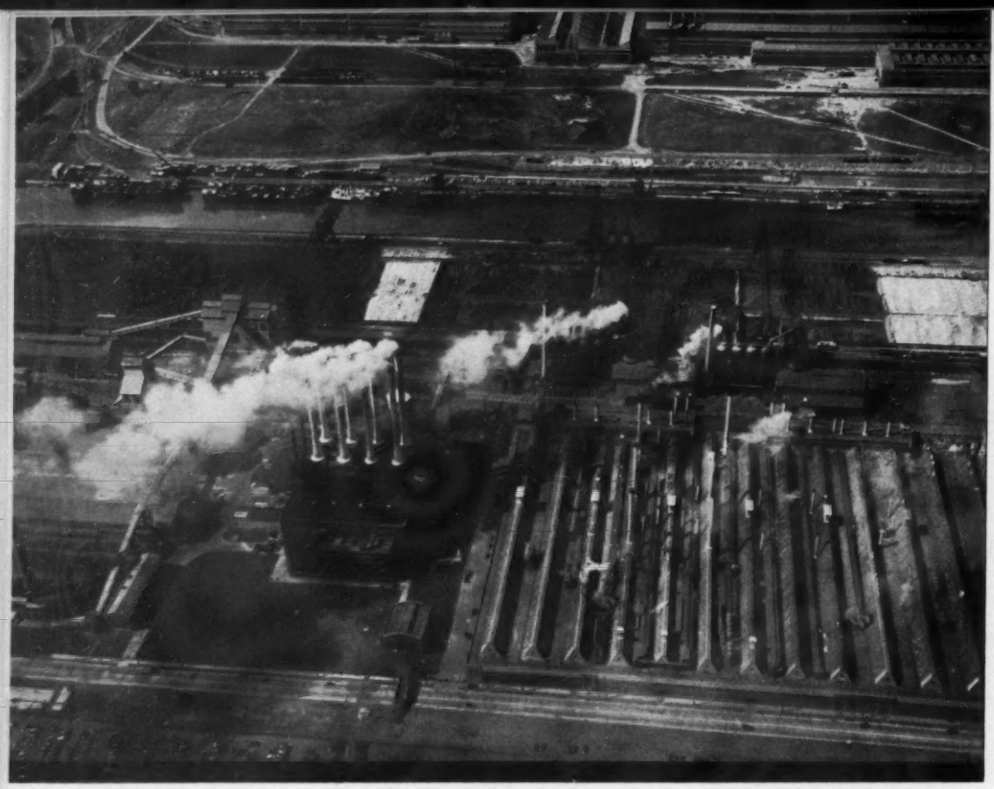
The evaporator consists of a number of cast iron heating sections, which are kept hot at all times by a supply of steam at constant pressure. That part of the brine side stream which is delivered to the evaporator trickles down over the heating surface; the brine is strongly concentrated by direct boiling of water from it, and by the fresh air sweeping over the hot liquid films, draft being induced by a stack extending above the evaporator case. The hot concentrated brine falls from the bottom of the evaporator sections into the main brine surge tank (14), and thence flows to the mixing and level tank (15).

The other part of the side stream flows by gravity to gravitometer (16), and thence to the mixing tank (15).

The gravitometer contains a delicately balanced weighted float, operating an air pilot device which controls diaphragm valve (12). In case the concentration of the brine flowing through the gravitometer tends to increase, the float rises, and partially closes off evaporator brine control valve (12), thus reducing the amount of brine passed over the evaporator. This action reduces the amount of water evaporated from the system as a whole, so that the brine is permitted to dilute back to normal concentration through its absorption of water from the gas. Conversely, decline of the brine concentration below normal causes the float to sink, opening valve (12) wider, and therefore increasing the rate of evaporation of water so as to bring the concentration back up to normal.

The concentrated brine and the brine from the gravitometer flow together into the level tank (15). This tank is provided with a pilot type level control (17), which controls the speed of the brine return pump (18) through the diaphragm valve (19) on the steam supply to the pump. The pump returns the concentrated brine to the main circulating system.

The Liberal gasoline absorption and gas dehydration plant is being built under turnkey contract by the Stearns Roger Manufacturing Co. of Denver, under designs and patents owned or applied for by Parkhill-Wade, Inc., of Los Angeles.



● Hub of the U. S. motor industry is Detroit. Shown at left is a sky-view of Ford Motor Co.'s mammoth River Rouge plant, a few miles out of Metropolitan Detroit. Below is Detroit's General Motors Building, world's largest office structure, which houses the central headquarters of the General Motors enterprises. Manufactured gas from the lines of Detroit City Gas Co. for many years has filled a primary fuel need in automotive and general manufacture. Now natural gas brings further fuel advantages to industries of the Detroit area, opening new sales opportunities for the industrial gas department.

NATURAL GAS FOR DETROIT INDUSTRY

INDICATIONS are that the sale of fuel to Detroit industries may eventually outstrip the supply of natural gas available under the present contract of 90 million cu. ft. maximum per day, making it necessary for the Detroit City Gas Co. to call into active service the four water gas plants which it has equipped to manufacture 1,000 B.t.u. gas, in order to meet the demand.

It is not without benefit to the Detroit utility that considerable agitation has developed in recent years in behalf of piping natural gas to the city. This factor has helped to make industrials "natural gas conscious," and they are welcoming the new fuel with open arms.

A survey was conducted recently by principals acting for the city, to sound out the interest of industrial plants in natural gas. Industries were asked whether they would avail themselves of the fuel, were it at hand, and the answers were preponderantly in the affirmative. A leading automotive manufacturer provides an interesting case in point. This company notified executives of the gas company that it could easily increase its use of gas several times over with the piping of its plants for natural gas. In this particular case, however, a considerable investment would be required on the part of the gas company to pipe the gas to the plants.

The gas company's aim will be to sell as much of the fuel as possible through existing services. It will also go after the business which can be secured most easily and in which gas can most efficiently replace other existing services.

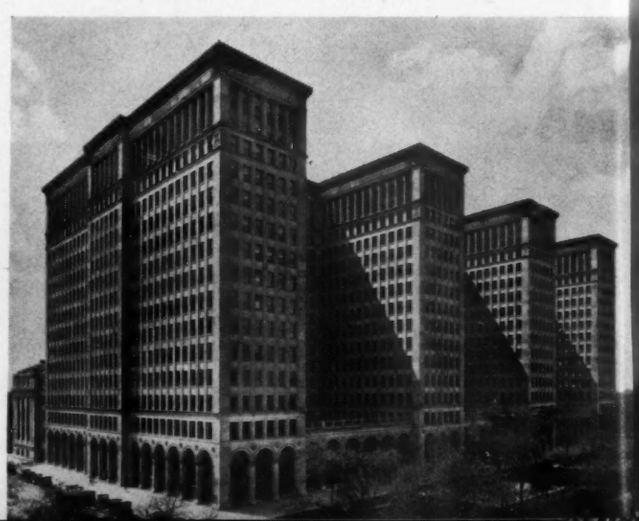
There were upwards of 3,000 industrial customers on the books of the gas company, ahead of the coming of natural gas. The following 36 firms were at the top of a list of 200 of the largest gas consumers for the month of June:

General Motors Corp.; Chrysler Corp.; Detroit Steel Products Co.; Detroit Michigan Stove Co.; Briggs Manufacturing Co.; Bohn Aluminum & Brass Corp.; Kelsey Hayes Wheel Corp.; Hudson Motor Car Co.; Timken Detroit Axle Co.; Packard Motor Car Co.; L. A. Young Spring & Wire Corp.; Aluminum Co. of America; Eaton Manufacturing Co.; Borg Warner Corp.; Great Lakes Steel Corp.; Continental Baking Co.; Mitchell Smith Co.; Kroger Grocery & Baking Co.; Ford Motor Car Co.; Thompson Products Co., Inc.; McCord Radiator Mfg. Co.; Allied Products Corp.; The Midland Steel Prod. Co.; Barnes, Gibson & Raymond; National Twist Drill Co.; Michigan Tool Co.; Great Atlantic & Pacific Tea Co.; Hoskins Mfg. Co.; Ward Baking Co.; The Murray Corp. of America; Bowen Products Co.; Peninsular Metal Products Corp.; Ex-Cell-O Aircraft & Tool Corp.; Vincent Steel Process Co.; American Radiator Co. Mfg. Div.; Burroughs Adding Machine Co.

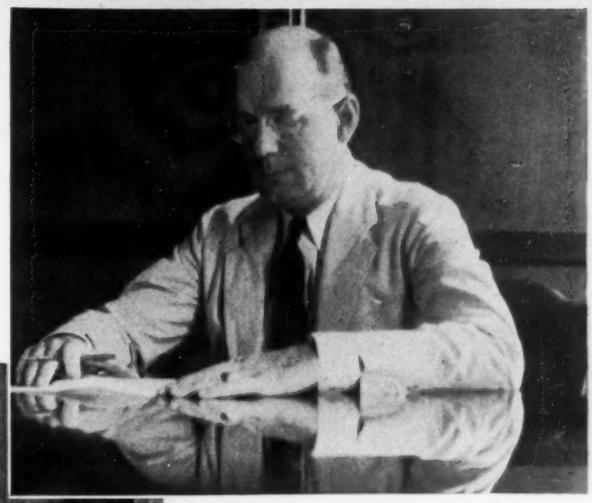
In one of the larger industries in the city there are 36 major gas units in operation, 248 minor units and 40 miscellaneous small units, making a total of 324 gas-operated units. The consumption of gas in this plant in 1935 was 390 thousand Detroit Gas Units of 530,000 B.t.u. per Detroit Gas Unit.

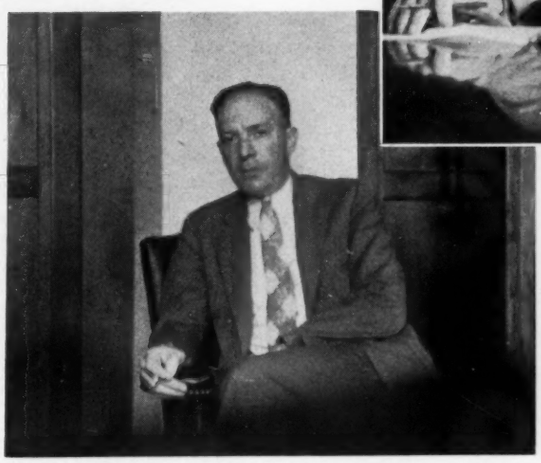
Another plant has 56 major units, 30 minor units and 148 miscellaneous units with a total of 234 in all; 432 thousand Detroit Gas Units were consumed in this plant in 1935.

A third plant had 49 major units, 33 minor units, 105 miscellaneous units for a total of 187 *(Continued on Page 67)*



PIPELINERS: Jack C. Reinbold (right), general superintendent of Michigan Gas Transmission Corp., during the construction period (loaned by Panhandle Eastern), carried a big load of the responsibility for the new line's successful completion. So did D. K. Stephens (entering car), construction superintendent.





GENERAL MANAGER S. S. Young (seen at desk above), is actively in charge of operating the Michigan Gas Transmission Corp.'s new natural gas carrier.

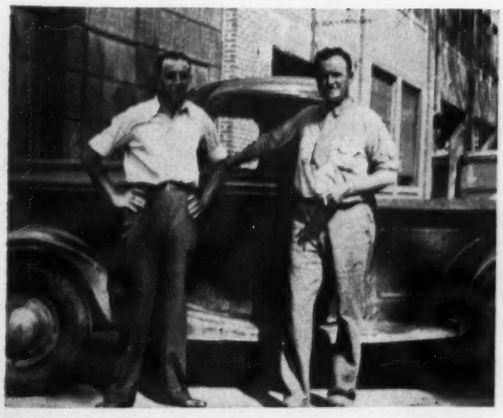
AT LEFT: L. E. Ingham, newly appointed general superintendent of Michigan Gas Transmission Corp.

Along the Detroit Line with GAS CAMERA

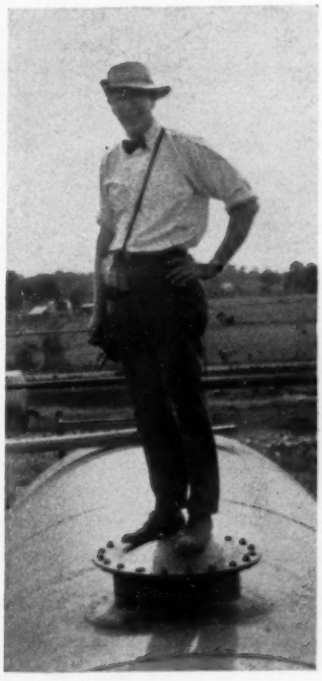
COMPRESSOR stations in Kansas and Texas, on the Panhandle Eastern system, were contracted to The Fluor Corp. Left-to-right are J. S. Fluor, Jr. (vice-president) and P. E. Fluor (president).

DEHYDRATION and gasoline absorption plant at Liberal, Kan., was engineered by Parkhill-Wade, Inc. Henry N. Wade (below) was snapped on the scene.

INDIANA AND OHIO portions of the line were laid by The Bibb Contracting Co. of Dallas. W. S. Bibb (left) and his son Jack are seen below, during the construction period.



PIPE LINE in Michigan was laid by United Engineers & Constructors. Here are F. L. Johnston (right), superintendent, and E. C. Bradfield, master mechanic for United Engineers, on the job.



COMPRESSOR STATIONS

Seven New Stations Add 26,000 H. P. to Panhandle Eastern's System; 42,000 H. P. Total When Complete

By GEORGE T. KOCH

Superintendent of Compressor Stations, Panhandle Eastern Pipe Line Company

THE transportation and delivery of natural gas from the Texas Panhandle to Detroit involves a great many operations and activities other than the laying of pipe lines, construction of river crossings and the installation of meter and regulator stations. An operation and activity of major proportion and consequence is the construction of compressor stations to boost the gas from the wells in the field to the point of delivery at the eastern terminus of the line. With the signing of the contract to deliver gas to the Detroit City Gas Co., Panhandle Eastern Pipe Line Co. found itself confronted with the necessity of designing, constructing and placing in operation a number of compressor stations along the existing pipe line system, the whole project to be completed within a period of about 220 days. Numerous studies were made and calculations, based on existing and anticipated loads, indicated the necessity of installing 26,000 horse power in seven new compressor stations and the addition of 2,000 horse power to the existing compressor station at Liberal, Kansas. This 28,000 horse power added to the horse power now installed provides a total of 42,000 horse power on the Panhandle System between Texas and the Illinois-Indiana state line. In addition 2,600 horse power is being installed at Montezuma, Indiana, by the Michigan Gas Transmission Corp. The existing horse power on the Panhandle System is divided between three stations constructed in 1930 and 1931 at Liberal, Kansas (5,000 H.P.), Louisburg, Kansas (5,000 H.P.), and Glenarm, Illinois (4,000 H.P.).

GEORGE T. KOCH

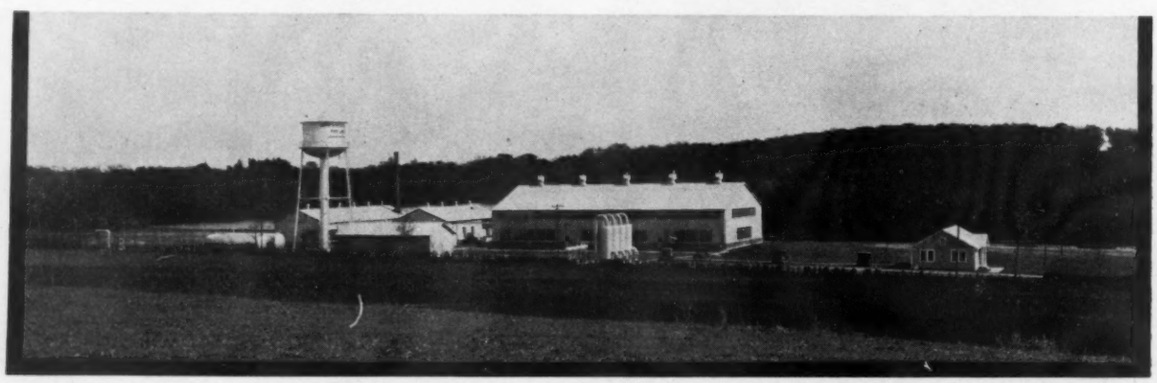
During the first winter's operation under anticipated peak load conditions, ratios of compression will vary from 1.3 to 2.2 with an average of approximately 1.55. Ultimately the completed system, when all additions have been made to the stations, will operate at a 1.65 ratio. Discharge pressures have been held to a 460-lb. gauge maximum. On page 22 is a map of the Panhandle System with locations of compressor stations, horse power installed or being installed this summer, and intake and discharge pressures at the stations during the coming winter under anticipated peak load conditions.

In general, the stations are entirely orthodox although here and there certain features have been incorporated into the design which are a departure from usual compressor station design. Buildings will all be structural steel, clad with asbestos-cement corrugated siding and roofing. Main compressor buildings are 72 feet wide with full span 12-ton traveling cranes supported from building columns. Bays are 14 feet wide and 21 feet to the square. The main buildings have full basements and piping has been designed so that there is 6-foot head clearance under all piping on both the power and compressor ends of the main units. A machinery door of the vertical lift type is installed in each building to permit ease of handling large engine parts and to insure tightness against dust and cold. Buildings in Texas and Kansas are fitted with rotary type ventilators, equipped with louvers, dampers and screens, while those in Missouri and Illinois are fitted with continuous heat valve ventilators.

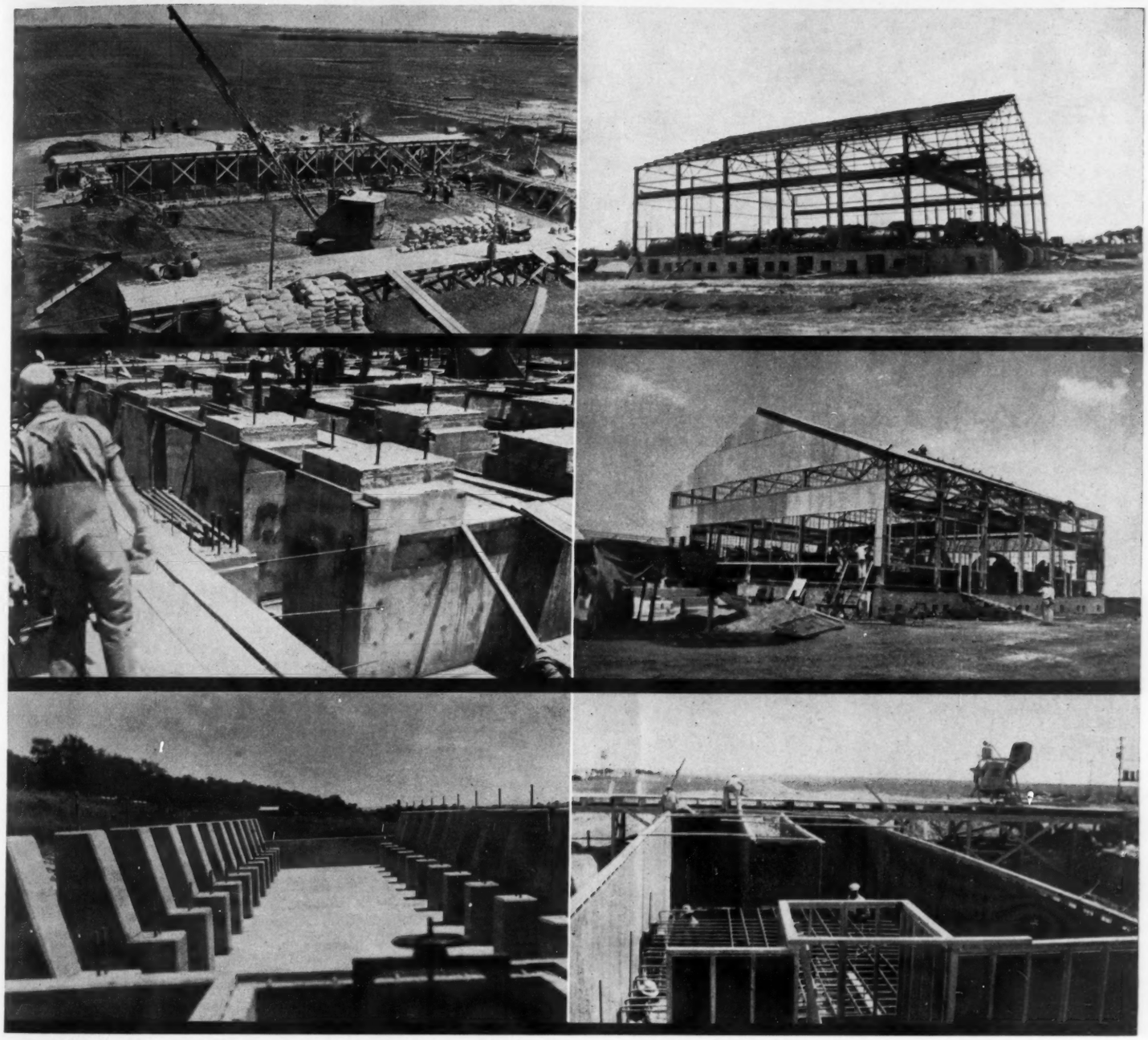
Auxiliary buildings are 128 feet long and 36 feet wide and all auxiliary equipment and services including water treating plant, machine tools, locker and washroom, wareroom for small parts and supplies, and chief engineer's office, have been assembled in this building. The only other buildings on the site are a meter house, a garage, well houses, and a residence for the chief engineer.

Buildings will be heated by means of floor type unit heaters, thermostatically controlled; steam at 15 pounds pressure being generated in welded steel heating boilers. Condensate is returned to the boilers by means of completely automatic motor-driven condensate pumps located in the pump pit in the auxiliary building.

An innovation which will serve several purposes is the installation of air-cooled exhaust mufflers on the main units. This type of muffler has been used for several years on the west coast on small units. Motor-driven blowers and air washers have been incorporated in the mufflers so that the main building



Exterior of Panhandle Eastern Pipe Line Co.'s Louisburg station.



UPPER (Left): Pouring main building mat for the Haven, Kansas, station. Construction set-up shown is standard for pouring mats and main engine foundations for the Panhandle Eastern stations. CENTER (Left): Main engine bases at the Haven station. Concrete has not been rubbed or finished. Floor steel is going into place. LOWER (Left): Cooling tower basin piers at the Pleasant Hill station—typical cooling tower basin with tower and gas cooling coil supports. UPPER (Right): Main building steel erection at the Haven station. Note elevation of operating floor above grade. CENTER (Right): Transite erection proceeding on the main building at Haven station. LOWER (Right): Sneed station, showing main engine foundation being formed with five-ply lumber.

may be heated in cold weather and cooled in warm or dusty weather with washed air. The washed air feature has only been incorporated in the western stations located in the "dust bowl" area. When operating as a heater, cold air is induced by a blower between the exhaust manifolds and an outer casing, heated and returned to the building through a system of ducts over the windows. Necessary precautions have been taken to avoid any poisoning of the heated air with exhaust gases. When operating as a cooler and air washer, a valve is closed and the blower takes suction from outside of the building drawing the air through a spray chamber and mist extractor before blowing it into the building. When operating as a cooling system, the exhausts are cooled by air induced around the exhaust manifold by the pull of the engine exhaust itself. The blowers have a capacity of 4,000 and 10,000 cubic feet per minute and are driven by 1½-H.P. and 3-H.P. motors. The larger size blowers are installed on the exhausts having the air washing feature and it is anticipated that the capacity of these blowers will be sufficient to build up a plus pressure of about ½ inch of water in the building, thereby restricting if not entirely eliminating the infiltration of dust during a dust storm.

Main units in all of the new stations are 24 by 36 inches, 1300 H.P. twin tandem; compressor cylinders are of 15-inch diameter, equipped with two 2½ inch unloader valves, each pocket having a capacity of 1,150 cubic inches. Twelve of the main units were purchased from the Cooper-Bessemer Corp. and eight from the Worthington Pump and Machinery Corp. Two 1,000-H.P., 21½-by 36-inch Cooper-Bessemer units are being added to the Liberal Compressor Station. Griscom Russell Bentube sections are used throughout for gas cool-

ing. These are installed in the basins of Fluor Aerator-type cooling towers. Sufficient coils have been provided to insure cooling the capacity of the line under the most adverse conditions to 90°F. At Liberal Compressor Station sufficient additional coils have been added to bring the gas temperature down to 80°F. to permit processing through a gasoline absorption and gas dehydration plant which is being installed there. A description of the dehydration unit will be found elsewhere in this issue.

As far as possible and practicable, all piping is shop-fabricated, the only exception being drain lines, a few water lines and very small oil lines and gauge piping. Grade "B" seamless pipe is used throughout the plants and all flanged connections are Vanstone, Series 30 being used on all high pressure gas and starting air, Series 15 on water, fuel gas, etc. On high pressure gas lines alloy steel studs with carbon steel hexagonal nuts are used on all flanged connections. Merco Nordstrom plug valves are used in all high and low pressure gas and air lines. All plug valves 6 inches and larger are either spur or worm gear operated. Crane valves of various types are used on water lines, oil lines, drain lines, etc.

Three makes of auxiliary engines are being used, Cooper-Bessemer, Worthington, and Chicago Pneumatic. All are of the vertical high speed type, 400 R.P.M. —514 R.P.M. The Worthington units are direct connected to Westinghouse 125 K.W. generators. Electric Machinery Corp. generators of the same size are used with the Cooper-Bessemer and Chicago Pneumatic units. General Electric cubicle enclosed switch-gear, with all instruments flush mounted, is used throughout. A 120-208 volt network system is used for distribution of light and power, standard 220-volt motors being used rather than special 208-volt. The lights, lighting panels, motor controls, etc., in the gas operating area are all vapor or explosion proof.

Cooling tower and jacket water pumps are Worthington direct connected to 20- and 25-H.P. General Electric motors. A 75,000-gallon elevated steel water tank furnished by Chicago Bridge & Iron Works floats on the discharge jacket water pumps. This capacity is sufficient to keep the plant running 60 minutes in the event of pump failures.

Both motor driven and gas engine driven Ingersoll Rand starting air compressors are provided in each station. The motor driven unit will deliver 55 cubic feet per minute against 250 pounds pressure, the gas engine driven unit approximately 30 cubic feet per minute against the same pressure. The motor driven compressors are provided with automatic unloaders and automatic start and stop pressure regulation through a pressure switch. Air receivers will float on the discharge of the compressors which will be automatically started and stopped between certain desired low and high pressure conditions. *Hand-off-automatic* pilot switches are provided in all circuits

A Permutit Zeolite water treating plant of the semi-automatic type having a water treating capacity of 300 gallons per minute is installed in each plant. Raw water from the water wells is pumped directly through the treaters by deep well pumps into the hot well. The supply of plant make-up water is automatically controlled by float switches installed in the hot wells, cutting in and out as low or high levels are reached in the hot well. *Hand-off-Automatic* switches are provided in the event it is desired to run the pumps continuously using raw water for sprinkling or other purposes. A separate system is provided in each plant for drinking and residential purposes. In one or two instances some difficulty was experienced in obtaining adequate water supplies. In one Kansas plant it was necessary to go approximately 7 miles from the plant for water. Because of the distance, water supply pumps at this location are not automatically controlled, but are driven by gas engines fitted with Mercoid controls on circulating water and oil systems which short the magneto in event oil or cooling water fails. These pumps pump through a 6-inch line into a 3,000,000-gallon reservoir at the plant. Water at all plants is obtained from wells ranging in depth from 50 feet to over 1,300 feet.

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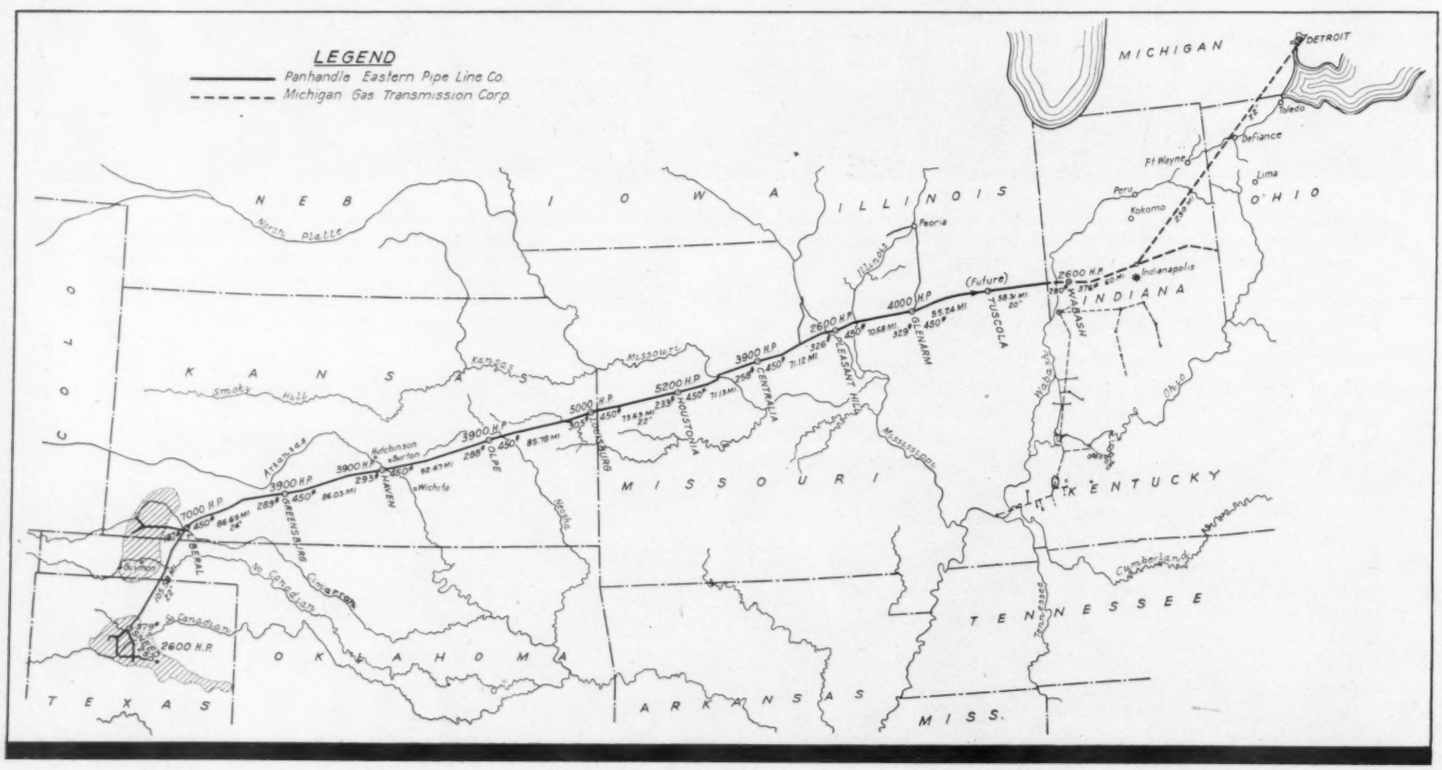


Skyline of Detroit as seen from Windsor, Ontario, Canada.

DETROIT CITY GAS COMPANY

Gas Service in Detroit Dates from 1848; Includes 413,000 Meters in 35 Communities

THE year 1893 that saw the two-cylinder horseless carriage of Henry Ford chug-chugging down Bagley Avenue, Detroit, also witnessed the formation of the Detroit Gas Co., which five years later was to emerge as Detroit City Gas Co., the company now engaged in changing its system over to the service of straight natural gas.

The city's original gas service dates back to 1848 when Brown Bros. of Philadelphia organized the Detroit Gas Light Co. They constructed a small gas plant on Woodbridge Ave., between 5th and 6th Streets, shortly after organization, depending for revenue almost wholly upon street and domestic lighting.

A rate of $3.50 per thousand cu. ft. was inaugurated at the outset of service, this rate continuing for a 10-year period, then being reduced to $1.50 for public lighting and $2.50 for private consumption. Two additional gas plants were erected in 1866 to meet increasing requirements for gas.

The Mutual Gas Co. was organized in 1872 as a competing organization, with the two companies later merging under the name Detroit Gas Co. The merged companies received a 30-year franchise from the city in 1893, and Detroit City Gas Co. took over this franchise at its formation in 1898.

In 1888 Michigan Gas Co. was organized to bring natural gas to the city, depending for supply upon fields near Toledo, Ohio. A pipe-line was constructed from these fields shortly after local interests formed the company.

WM. G. WOOLFOLK
President, Detroit
City Gas Company

C. W. BENNETT
Vice-President and
General Manager

The gas supply in the Ohio field began to be depleted in 1894 and the company turned to Canada as its source. For a 5-year period Leamington, Ontario, natural gas was brought to Detroit through two lines extending across the Detroit River. The Canadian Government stopped the exportation of natural gas as a conservation measure in 1901.

In the period prior to the discontinuance of natural gas service there were approximately 5,000 meters on this service out of a total of approximately 20,000 meters on gas in the city.

The original charter of the Detroit Gas Light Co. had expired in 1898 and upon this foundation was built the gas company which stands today, a leading factor in the commercial life of the city.

In 1898 when the company was formed, the city of Detroit had a population of approximately 300,000. Today the population is 1,560,572.

Two years after formation its gas facilities included 308.5 miles of pipe line with 38,477 meters in service. In 1910 pipe line mileage had increased to 561.4 and total meters to 86,911.

By 1920 the pipe line system was almost doubled, this being partly brought about by the company's absorbing the Detroit & Suburban Gas Co. in 1913. The pipe system in 1920 amounted to 1,055.8 miles, and meters by this time had jumped to 220,183.

Today, as natural gas enters the system, the total mileage of gas main amounts to 2,614, and 413,000 meters are in service.

Fourteen large capacity holders located through the city impound the gas for these customers. Total capacity of the holders is 55 million cu. ft.

One of the first steps of the company after organization in 1898 was the reduction of gas rates to 80c per thousand cu. ft. for fuel purposes and to $1.00 per thousand for lighting purposes. This was later reduced to 35c for industrial purposes and 75c for general purposes, with a sliding scale established for varying amounts used.

Under manufactured gas service Detroit rates have been lower than prevail-

(Continued on Page 28)

DETROIT CHANGE-OVER

Force of 1,500 Recruited to Finish Conversion by November; 27 Change-over Districts Formed

By CRAIG ESPY
Midwestern Manager, GAS

NATURAL gas was introduced into change-over District No. 1 of the Detroit City Gas Co. on July 9, and was available on September 1 in approximately one half of the homes and industries in the city. The entire conversion will be completed early in November.

"The Detroit change-over," says C. W. Bennett, vice-president and general manager of the company, "includes four main steps: (1) Securing a gas supply adequate to the needs of a city the size and industrial importance of Detroit; (2) Taking the proper steps to inform the public about the gas and its advantages; (3) Making the physical change-over; (4) The promotion of sales."

Detroit City Gas Co. signed a contract more than a year ago with the Panhandle Eastern Pipe Line Co. for delivery of an adequate supply of natural gas. The public has been partly prepared for the service, through various proposals laid before the city at intervals during recent years. But when contracts were actually signed between distribution interests and the source of supply, a program of advertising and publicity was set in motion in order to sell the city on the advantages of natural gas.

The source for this publicitty was both the gas company and city officials who felt that a favorable disposition had been made of the problem of natural gas service, discussed before the city over a period of years.

The story of natural gas was told through newspaper space, publicity stories, direct mail, car cards, bus cards, bill boards, home service lectures, special training courses offered to company employees and to salesmen of local merchandising outlets. In fact, almost every available avenue of approach was used to get the facts to the public.

Nine hundred street cars and buses have carried double-cards, consistently, with copy being changed periodically. Two hundred large bill boards have been in service in addition to the number customarily used by the company. One-piece posters have also been brought into service with several hundred of these being spotted around the city. These are guaranteed for one-day service but many of them remain in position indefinitely.

Special cards were also displayed from 500 pieces of gas company automotive equipment, at both the rear of the car and on each door. Advertising cards have also been displayed from special panels in all gas company offices and in stores of dealers, plumbers and other merchandising outlets.

Special house heating bulletins have been mailed out upon request. Industrial customers have received booklets, bearing complete information pertaining to the change-over.

A message of newspaper page-size, written by William G. Woolfolk, president of the company, has been mailed out to all customers. It announced the approach of natural gas, referred to the nationally known "Detroit Plan," related that the change-over was the largest engineering task of its kind ever undertaken, and fully described the

TURN-ON CEREMONY

(See Photo at Left)

Executives of the Detroit City Gas Co. attending the turning-on ceremony which brought natural gas to Detroit on July 9. Charles W. Bennett, vice-president and general manager, stands to the right of a picture of William G. Woolfolk, president of the company, who was unable to be present. Left to right: George T. Bentley, ass't to supt. of mfgr.; William R. Fraser, chief chemist; A. N. Outzen, supt. of station J, River Rouge plant; L. G. Wisely, supt. of stocks; Arthur H. Anderson, general manager, Universal Engineering Co.; Frank J. Hall, supt. of streets; W. G. Boley, purchasing agent; Charles L. Ruff, field foreman, shops dept.; H. A. Trump, advertising counsel; N. E. Loomis, sales manager; A. I. Snyder, engineer; J. W. Batten, vice-president and ass't general manager; Charles S. Ritter, secretary and treasurer; Frank J. Woolfenden, supt. of pressures; E. F. Gulich, general foreman, street dept.; Hale A. Clark, industrial engineer; Mr. Bennett; W. L. Cross, supt. of shops; T. W. Weigel, house heating engineer; Adam Kurtz, controller; Henry Fink, supt. of mfgr.

Detroit Gas Unit plan and the promotional rate that has been adopted. Further reference will be made to some of these points at a later place in the article.

The Home Service department's position in informing the public about natural gas has been an important one. Lectures have been given by this group in the auditoriums of schools, stores, hospitals, before women's clubs, girl scout organizations, church groups, etc.

Passing to more technical phases of the change-over, we find engineers of the gas company, have for years in advance of the arrival of natural gas, been studying conversion technique, realizing that with many major cities of the country turning to natural gas, the eventual course would lead Detroit to do likewise, whenever an adequate supply of gas materialized.

With the signing of contracts the group that was to head-up the change-over swung into action, arranging for key men to visit many of the gas systems previously converted to straight natural or mixed gas to gain at first hand the essential practices of the trade and to establish the procedure that would govern the Detroit change-over. This tour embraced the cities of Chicago, Davenport, Philadelphia, Minneapolis, Denver, Muskegon, Saginaw, Bay City, Memphis, New Orleans, Birmingham, Atlanta, Syracuse, Peoria, Louisville, Toledo, Omaha. Representatives of the Manufactured Gas Department, Distribution Department, Industrial Department, and chemists, made the trip.

Subjects given special attention on the trip included the experience of others relative to arrangement of the gas systems for change-over; method of adjustment of appliances; suitable gas for stand-by, methods of handling the peaks of winter, and similar subjects.

The system selected by Detroit executives for their change-over embraces sectionalizing the distribution system into 27 districts, which could be completely isolated, one from the other.

Coke-oven gas is manipulated into the district about to be converted, with the pressure being raised from 5½ inches normal water column to 9 inches water column. Natural gas is then introduced into one end of the district at 9 inches water column. The coke-oven gas is either purged by consumption or definitely purged in sparcely settled areas. The pressure is then set at 7 inches pending the final adjustment of appliances, and following this to 5½ inches.

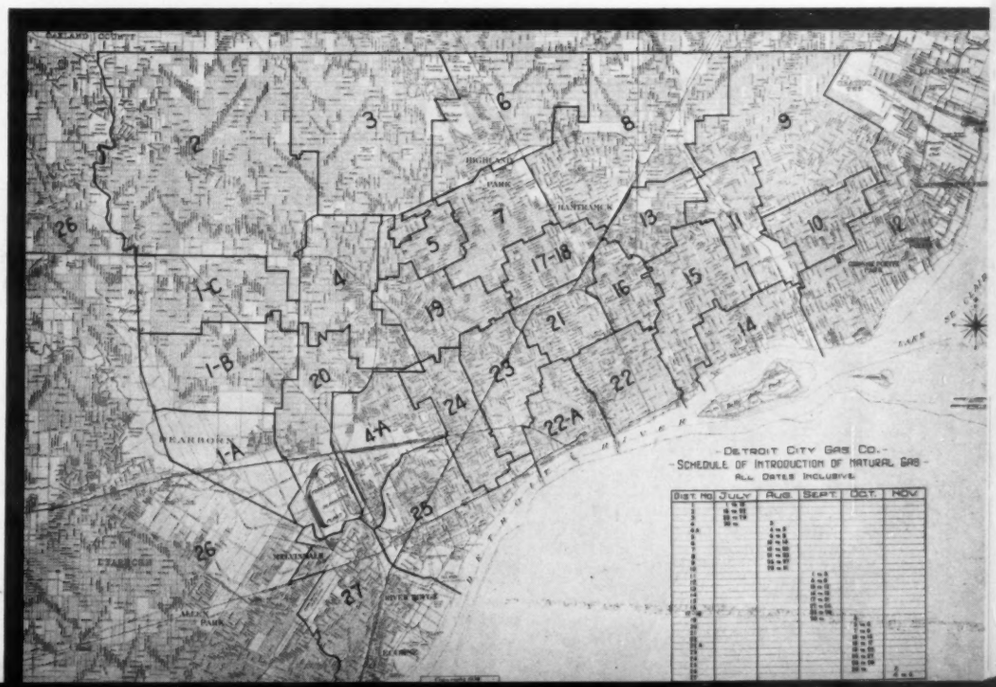
A special device that indicates whether natural gas has reached a given point in the system, supplanting the coke-oven gas, has been developed by the company's engineers. The testing device consists of a special adapter to fit on the inlet swivel of a 5-Light meter rigid connection, and to connect to a 50-foot length of hose. The hose is run outside through the basement window, and connects to a purge apparatus. The purge apparatus consists of 6 feet of ½-inch pipe with a 2 foot steel rod brazed on one end of it, so that this rod can be put in the ground. The hose is connected to the ½-inch pipe, through a tee and valve, to furnish gas to a small test burner. The test burner consists of a simple Bunsen burner placed in the center of a section of stove pipe 4 inches in diameter and 1 foot long, the purpose of the stove pipe being to prevent the flame from the Bunsen burner from blowing out in the wind. Gas is ignited at both the test burner and the end of the purge pipe. The flame of the Bunsen is watched carefully, and also the flame coming from the end of the purge pipe. As natural gas replaces the oven gas, the Bunsen flame increases in length, and the flame at the top of the purge pipe becomes almost transparent and starts to lift.

Two visits to the premises of each domestic and commercial customer are provided in the Detroit Change-over system. The first calls for a preliminary adjustment of appliances to burn coke-oven gas at 9 inches water column. Following this natural gas is introduced and the pressure is set at 7 inches water column in the district. On a second visit the adjustment is completed for natural gas.

Change-over of a district, from the first step until the district is entirely completed, occupied a period of from three to 10 days, depending upon the number of meters in the district. No advance notification to the housewife is required under the plan, since the appliances will be in adjustment all the time.

Universal Engineering Co. of Delaware is handling the change-over under a contract awarded by Detroit City Gas Co. Arthur H. Anderson, one of numerous key men of the gas company, farmed out to the engineering corporation, is general manager of the change-over organization. This company reports to A. I. Snyder, engineer of Detroit City Gas Co. who has general super-

• **Detroit City Gas Co.'s service area showing the 27 "change-over" districts.**



AT LEFT:

This special truck-and-tanks unit was designed by the Detroit City Gas Co. to transport natural gas from pipe line sources at Glenarm, Ill., and Toledo, Ohio. The gas was used for experimentation and tests prior to the "change-over", and in the preliminary instruction of the change-over crew. The tanks are 20 inches in diameter, 22 feet long, constructed for 570 pounds working pressure, and are mounted on a semi-trailer unit, five tanks to the unit.

vision of the change-over activity.

Fifteen hundred men are engaged in making the conversion. Two hundred of these, also farmed out to the contractors by the gas company, act as supervisors and foremen. Included in the 1300 new employees are many having had change-over experience gained in other cities.

Every man has been put through a week's intensive training period in preparation for his post. Samples of all of the appliances to be found on the Detroit system have been available at the educational headquarters, set up at the Tireman Avenue plant, where they are available for instruction. While the students have access to all these appliances each one is expected to master the make-up technique of adjustment of 16 ranges and eight water heaters. These are adjudged as covering typical examples of all appliances.

The first class of recruits added to the conversion force entered the school on June 27, completing their training on July 6. Each week thereafter approximately 250 men were graduated until the force was built up. The school of instruction is conducted in both day and night shifts. Instructors went into the field as foremen as the school work was completed.

Out on the firing line the men operate in crews of 8 to 10 routine adjusters, 1 special adjuster and foreman. A section supervisor looks after 10 crews, reporting to the major supervisor and other staff men.

The men wear special uniforms bearing the insignia of the gas conversion contractor, which is similar to that of the gas company, carry a special identification card and prior to final employment have been finger-printed by the local police department, under arrangement of the gas company. The finger prints are checked and registered at the identification bureau, Washington, D.C.

Two changes of uniform a week are given the men, who are required to maintain neatness of appearance under rigid daily inspection.

For experimentation purposes in both laboratory and training school, natural gas was transported from a natural gas pipe line source in Glenarm, Ill., and from Toledo, Ohio, in specially constructed tanks. Natural gas transported in this way was also impounded in a gas holder. Both natural gas and coke-oven gas was piped to the laboratory for extensive test work and for the school of instruction.

Industrial consumers are conducting their own change-over under the direct supervision of the Industrial Department of the gas company. A survey of all industries was made and a close study given of all gas-burning applications. Specific recommendations were set up in this way for the change-over. A report of the recommendations covering the requirements of the change-over was filed with each customer. This report was delivered and fully explained as a surety for complete understanding.

An industrial laboratory has also been set up where gas equipment is demonstrated for the instruction of industrial customers. Samples of all combustion equipment to be found in the city are exhibited at the laboratory.

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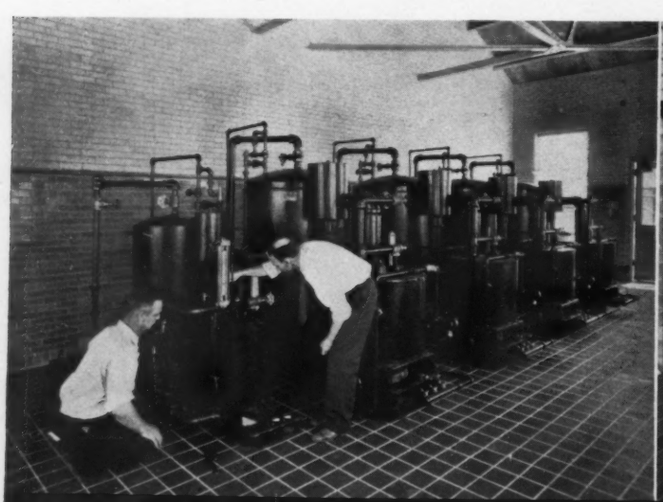
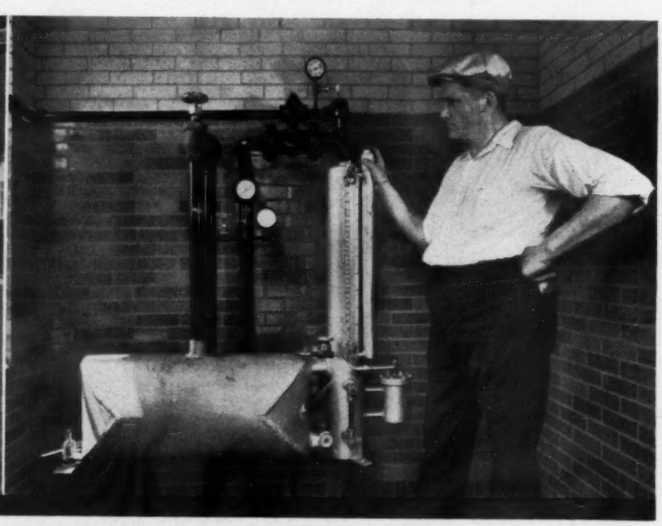


DETROIT CITY Gas Co. is taking steps to prevent drying out of its distribution system. Above is seen the Western Gas Construction oil fogging equipment in the new River Rouge regulator station.



THIS ODORIZING UNIT, of 100-million cubic feet per day capacity, now housed in Detroit City Gas Co.'s River Rouge regulator station is the largest by-pass odorizer built to date by Sharples Solvents Corp.

THE PIPE LINE PROJECT

The distance between headers is approximately 30 feet. Twenty-four feet of straight pipe is allowed on the inlet of each of the regulators, in order that heat may be applied in the event of regulator freezing.

The inlet and outlet of each regulator run is equipped with thermometer wells for the purpose of determining flowing gas temperatures. Bristol recording pressure gauges are installed.

Measurement and regulator stations are designed and planned by Fay C. Walters, superintendent of gas measurement of Panhandle Eastern Pipe Line Co., and J. E. Overbeck, measurement engineer of Columbia Gas & Electric. The plants are being constructed with Mr. Overbeck as engineer and Henry Humphrey as foreman, also in charge of layout and the cutting and fitting of piping.

Construction Organization

Although auto license plates from almost every state in the Union were strung along the pipe line construction scene, most of the manpower on the line came from the small towns and communities along the route.

The Bibb Contracting Co. employed approximately 900 men, exclusive of those in the service of sub-contractors, which carried the total to considerably more than 1,000. In at least two towns along the route the contracting company hired the entire relief roll. Approximately 700 men are employed by United Engineers & Constructors, operating on the north.

The contractors divided their respective districts into three units. Gang No. 1 of Bibb Contracting Co. constructed the line from Zionville north to Keystone, gang No. 2 from Keystone to Emmett, Ohio, gang No. 3 from Emmett north to the Michigan state line.

Gang No. 1 of United Engineers & Constructors operated from the Michigan state line to Raisin River, gang No. 2 from Raisin River to Huron River, gang No. 3 from the north bank of the Huron River to Melvindale.

Both contractors began to lay pipe on April 23, beginning at the southernmost points of their sections. On the record day some 16,200 feet of 22-inch pipe was laid and backfilled.

Operations on the line followed the usual pattern, with some modifications introduced to meet special problems.

Right-of-way gangs in addition to

(Continued from Page 15)

clearing obstructions, such as stumps, logs, trees, etc. from the course of travel, also puts in temporary gates where fences were to be crossed, and in general cleared the way for construction work.

The inspector on the stringing gang arranged with the farmer or land owner for entering his property, also securing information about the location of tile through the property and passing this information along to a foreman of construction so that tile and other equipment could be brought forward for replacement purposes.

Medium capacity trucks with long trailers were used in stringing the pipe.

The line-up gang, preparing the pipe for welding, placed the 40-foot random lengths on rollers and tack-welded the joints at four points approximately 90 degrees apart. The pipe was then ready for the firing line gang which completed the welds.

Following the welding gang the paint crew coated the line with a field primer in preparation for a coating of pipe line enamel or hot paint. The primer was poured on and spread with wide flat brushes. Pipe enamel heated to proper temperature in heat kettles was transferred to paint pots equipped with spreaders or pouring nozzles. As the hot coat was poured from the buckets the pipe was revolved by a device connected to a revolving automobile wheel, driven by the car motor with the rear wheel of the car jacked off the ground.

An 8-inch space was left unpainted at each end of the 80-foot welded lengths for the attaching of couplings.

A soil survey conducted immediately following the securing of right-of-way determined the disposition of special protective coatings. Field rod tests were made at 400-foot intervals throughout the course of the line. Laboratory tests were also made of the soil, together with accelerated tests for electrolytic action. The findings resulting from the three methods checked very closely. Water in the rivers was also tested for corrosive action with the result that river lines were protected in the same way as the land line.

Ditching methods and difficulties due to caving of sandy soil were commented upon at an earlier point in this article. With the ditch made ready the next operation was to join the 80-foot welded lengths of painted pipe, resting on skids immediately over the ditch. The pipe gang handled this operation and lowered the pipe into the trench as well. Mechanical couplings were put into place, tightened, inspected and covered with a coating of hot coupler compound similar to pipe line enamel.

When the 80-foot welded lengths were coupled together the connected pipe was lowered by use of slings supported by tripods above the trench, with chain falls or winches helping to control the lowering speed. The pipe was lowered in such easy stages that less than 1½ degree angles were formed at the couplings.

When the lowering was accomplished to the satisfaction of the pipe laying inspector the back fill gang with the aid of mechanical equipment pulled the excavated dirt back into the trench over the pipe. At road crossings and other places where necessary the backfill was tamped to prevent settlement. At other points the earth was dressed up to a crown over the trench so that the ground would resume its natural appearance when settlement takes place. Considerable hand labor and in some cases scrapers were employed along with the back filling machines so that the trench would be left in the best possible condition.

Repairs were also made to damaged fences, leaving them in as good or better condition than they were found. When the pipe line inspectors accepted the completed job, authorized representatives of the company visited the landowners to see that they were satisfied or that adjustment was made.

The line was tested under pressure as it was brought to completion. As soon as the line was completed on the South end, each section between gates was blown out to guard against dust and other foreign matter being left in the line. A cut-off was then made at gate valves, about every 30 miles, and the completed line subjected to a pressure of 430 pounds. Measurement was taken of the loss in pressure by means of a dead weight tester to insure tightness of the line.

Bends in the line were few and in general of small angles. Those made were hot bends. Heat was applied with gasoline torches and bending being done with blocks, tractors, etc.

In the early stages of developing the project, engineers in charge of surveying parties determined various shipping

Four 12-inch lines are used at river crossings, each equipped with Crane shut-off valves at either side.

points along the course of the line. About 40 railway points were selected where pipe, gate valves and miscellaneous material used for river headers could be shipped in carload lots. Less than carload lots were shipped to warehouses located at intervals along the line. The Ft. Wayne office of Michigan Gas Transmission Corp. controlled the handling of equipment for the entire line.

Array of Equipment

It has been stated that a greater array of the latest models of pipe line equipment was assembled on this line than on any previous line due to the early date that the gas was scheduled to reach Detroit. As an illustration, Gang No. 1 of Bibb Contracting Co., consisting of 300 men, operated the following mechanical equipment:

Two R. D. No. 7 Caterpillar Diesels with Cardwell all-steel booms; two R.D. No. 6 Caterpillar Diesels with all-steel booms; one Caterpillar No. 60 combination boom and winch; one Buckeye ditcher No. 48; two Buckeye back-fillers; seven combination clam shell and dragline units, large type, all equipped with 35- and 40-foot booms and large buckets; one large dragline on river crossings; four large International trucks with booms and winches; eight small gang trucks without booms and winches; two No. 30 Caterpillar Diesels with Cardwell booms; eight large paint pots built by Standard Steel Works of North Kansas City; four No. 30 Caterpillars without booms and winches, for moving equipment; eight International all-steel wagons for hauling materials; two No. 20 Caterpillar tractors for moving equipment; one No. 60 Caterpillar with 12-foot Adams grader for dressing up right-of-way; one Wilson welding machine and welder for repair work; two No. 30 tractors with boom and one without boom for moving equipment by welder; three Ingersoll Rand air compressors; six diaphragm pumps.

A like amount of equipment was in use with all three gangs except No. 2 gang which had one more drag line on right-of-way, due to caving ditch. This gang also had large draglines on the Wabash and Maumee rivers.

United Engineers & Constructors employed three No. 48 Buckeye ditching machines; seven No. 60 Caterpillars; two No. 30 Caterpillars with Cardwell side booms; three No. 15 Caterpillars with draw bars for hauling equipment; eight Cranes on Crawler bases equipped with clam shell buckets; six Ingersoll Rand compressors; numerous pumps; 12 trucks; three Model D Buckeye backfillers.

Jack C. Reinbold is general superintendent of Michigan Gas Transmission Corp., having been borrowed from Panhandle Eastern Pipe Line Co., to take charge of the project. L. E. Ingham is assistant superintendent, coming from the Columbia system, and D. K. Stephens is construction superintendent, having also come from Panhandle Eastern Pipe Line Co.

Sub-contractors on the project were C. Hobson Dunn of Dallas, stringing contractor on the Southern and Central sections, and Midwestern Construction and Development Co., stringing contractor on the Northern section. H. C. Price of Bartlesville received the welding contract, with G. W. Fowler as superintendent of welding.

■ ■

Large Michigan Gassers

The completion within the past few months of three gas wells with an initial production each of 50,000,000 cu. ft. of gas per day has boosted Michigan Natural Gas production into higher brackets. The record well for Michigan recently completed in the Midland field unofficially reported an initial production of 67,000,000 cu. ft. of gas per day.

DETROIT CITY GAS COMPANY

(Continued from Page 23)

ing rates in most cities operating under comparable conditions.

The eight-story gas building housing the operations of Detroit City Gas Co., standing at Bagley and Clifford Streets, was completed in 1926. Four floors and the basement had been constructed in 1916, with four additional stories being constructed 10 years later. The building is 100 ft. square in dimensions.

For 10 years prior to the construction of its building in the present location, the company had occupied what is now known as the Empire Building, which it had constructed in 1906.

That the gas company has kept pace with the growth of the city is shown not only by the increase in facilities and meters but is reflected as well in increased gas consumption.

Figures for 1910 show that the gas sales had increased approximately 47 per cent over 1900. Deliveries in 1920 totaling 12,561,816,400 cu. ft. represented an increase of 366 per cent over 1910. Gas sales have increased considerably since this period.

In addition to serving gas in Detroit proper the following cities, townships and villages in the Detroit area are embraced in the service:

Cities: Detroit, Hamtramck, Highland Park, Dearborn, Grosse Pointe, Lincoln Park, Melvindale, River Rouge, Wyandotte.

Villages: Ecorse, Grosse Pointe Farms, Grosse Pointe Park, Grosse Pointe Shores, Lochmoor, Riverview, Trenton, Allen Park, Belleville, Flat Rock, Inkster, Rockwood, Sibley, Canton Center, Trenton, Gibraltar.

Townships: Dearborn, Redford, Taylor, Van Buren, Canton, Romulus, Brownstown, Monguagon, Ecorse, Nankin.

Since 1906 the company has been affiliated with American Light & Traction Co., this organization having secured the property through acquisition of its common stock. American Light & Traction is in turn subsidiary to United Light & Power Co.

■ ■

Cities Service Buys Mineral Rights in Okla. Area

THE Cities Service Gas Co., Kansas City, Mo. has recently purchased in fee the mineral rights under the 65,160-acre ranch of the Stonebraker-Zea Land and Livestock Co., located west of Guymon, Texas County, Okla. The ranch is in the south end of the big Hugoton gas field and two of the largest wells in the field are tracts adjoining the northeast corner of the ranch.

One of these wells gauges 22,000,000 cubic feet and the other 50,000,000 cubic feet of gas on open flow tests. Production is from a limestone horizon around 2,600 feet in depth.

The Cities Service Gas Co. also holds leases on 93,000 acres within the proved limits of the field, most of which are in Texas County in the area immediately northeast of the ranch.

IT PAYS TO MAINTAIN "SEND-OUT" OF CLEAN GAS

Check these advantages:

- ☑ Reduction of Customer Complaints due to dust picked up by gas.
- ☑ Maintain Full Pipe Flow Area—Low Pressure Loss — No Dust Pockets.
- ☑ "Availability" of Compressors during Peak Loads.
- ☑ Lower Pump Station Upkeep Costs

This record of repeat orders from a large gas company proves the value they place on the continuous delivery of *clean* gas made possible through the use of . . . BLAW-KNOX GAS CLEANERS.

Number of orders—23
Total number of units—36
First purchase Sept. 30, 1931
Last purchase June 22, 1936
Used for City Gate, Town Border and Compressor Stations
Maximum working pressure—265# Ga.
Minimum operating pressure—MINUS 5# Ga.
Combined capacity at 20# Ga.—20,897,000 cf.hr.

Full information about Blaw-Knox Gas Cleaners is yours for the asking. An engineer will be glad to call on request and demonstrate a working model to show you why Blaw-Knox Gas Cleaners do such a good job.

BLAW-KNOX COMPANY
2033 Farmers Bank Building • Pittsburgh, Pa.

BLAW-KNOX

NATIONAL

FROM ZIONSVILLE (*near Indianapolis*) *to Detroit goes this new pipe line, the first large diameter line in recent years. It heralds the return of long cross-country pipe line construction.*

SEAMLESS

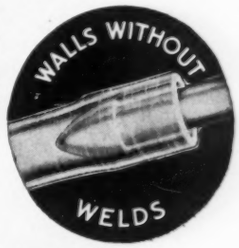
Now SERVES DETROIT WITH NATURAL GAS

Largest pipe line in recent years completed— 230 Miles of 22-Inch NATIONAL Seamless

FROM the fields of Texas, natural gas is flowing into the great automobile city of Detroit through the longest span ever covered by a gas line. The last link—230 miles of 22-inch NATIONAL Seamless—joined to the existing main near Indianapolis, is now completed and working.

From the day the first car of NATIONAL Seamless landed on the job until the last length was connected, this clean, smooth, strong pipe gave typical NATIONAL performance and once again proved its outstanding characteristics for important projects like this. Being seamless, there was no weld to worry about when strains due to bends, shocks or other severe installation difficulties were imposed. High tensile strength, ductility, long lengths, light weight, and smooth joint-making all combined to lower laying cost and facilitate completion of the job.

Remember, NATIONAL Seamless is pierced from a solid billet of steel which assures uniform wall strength, transversely and longitudinally. It is made by the largest manufacturer of seamless pipe in the world, controlling every step from ore to finished product—therefore no divided responsibility. Let NATIONAL engineers explain to you the full meaning of "Walls Without Welds."



NATIONAL TUBE COMPANY

UNITED STATES STEEL

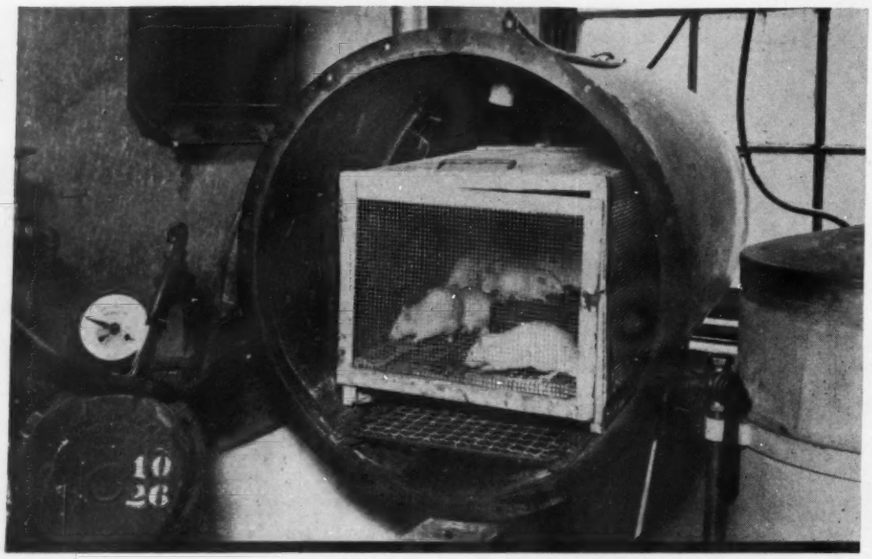


FIG. 1. Tank in which monkeys and rats were kept during exposure to natural gas.

PHYSIOLOGICAL EFFECTS OF NATURAL GAS

By DR. D. R. DRURY

Professor of Physiology
School of Medicine
University of Southern California

THE work reported here was carried out in the physiological laboratories of the University of Southern California. The gas used in the investigation is typical of that produced in the Southern California oil fields, and odorized and distributed for domestic use in the Los Angeles area.

The purpose of the work was to determine whether any physiological process is affected by natural gas. It had been known previously that this gas has no marked poisonous action; it was our aim to determine what alteration, however slight, the gas might cause in the physiological processes, even after prolonged application. Both human and animal experimental subjects were studied, the animals being used in tests involving long-continued exposure to the gas.

The first tests were carried out on rats. They were kept in a cylindrical iron tank approximately 2 feet in diameter and 3 feet in length, with one end covered with cellophane. Gas and air were continuously supplied to the tank in a proportion to maintain the desired mixture. Gas was taken from the ordinary domestic supply pipe, and air was supplied by a pump. Both were measured with gas meters and the rates were adjusted to give gas concentration of 8 per cent. Six rats (three males and three females) were kept in such a mixture for 36 days.

The animals ate well and stayed in good condition. Upon removal all rats were clean and healthy. A litter of new born rats, born during the night, were found alive at the bottom of the tank, having fallen through the floor grating. They were all in apparently healthy condition, but cold due to lack of mother care. The gestation period for rats is three weeks so that mating must have taken place during exposure. All rats but one showed gains in weight.

	WEIGHT IN GRAMS		RED BLOOD CELL COUNT	
	Before	After	Before	After
1.	110	115	8.5	8.2
2.	130	160	7.8	7.0
3.	105	105	7.9	7.0
4.	180	165	7.6	8.0
5.	185	203	7.7	7.9
6.	190	220	11.5	10.5

From the fact that the red blood cell counts do not have any definite trend we can say that the gas has no anemia-producing action.

After removal the rats were killed and their organs were examined for any abnormalities. Nothing of any sort was found wrong with them.

The next experiments were carried out on monkeys. These were chosen because their physiology is so similar to that of humans. A monkey was kept in the chamber and supplied with a mixture of 30 per cent gas in air. It remained in excellent condition, eating well and maintaining its weight, for 30 days. On the 31st day it was found unconscious and cold, and it died soon after. Autopsy showed nothing wrong with the organs. The cause of this sudden change in the animal's condition had every appearance of being the result of asphyxia and due to some mechanical disturbance in the gas-air supply system during the night. The test was repeated on two monkeys, with safety traps used to prevent such accidents occurring.

These monkeys were exposed for 31 days in a 30 per cent gas in air mixture. At all times they remained in excellent condition, eating well and becoming quite tame as the experiment progressed. On the thirty-first day they were taken

(Turn to Page 37)

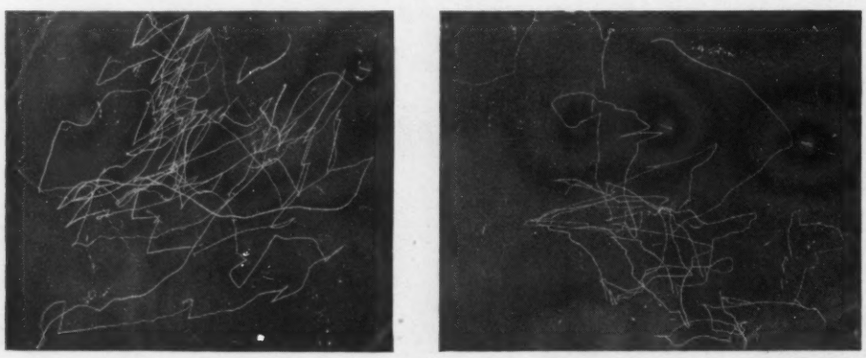


FIG. 2.

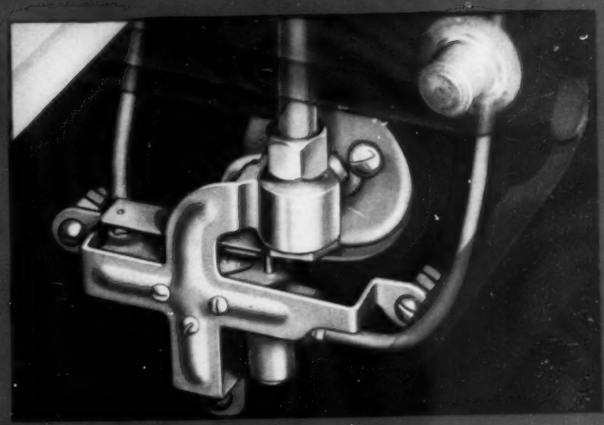
Before exposure. After exposure.

*Presented before the Pacific Coast Gas Association annual convention, San Francisco, August 25, 1936.

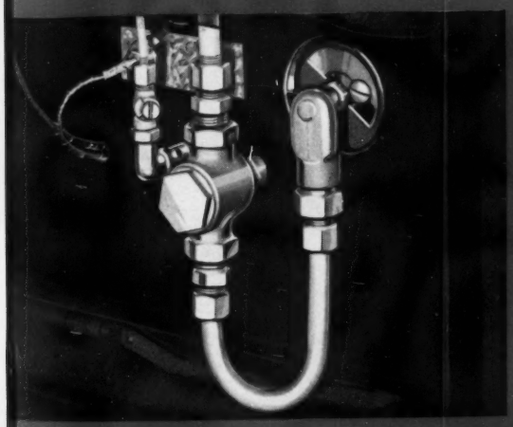
HERE ARE the startling and exclusive features that make the DETROIT JEWEL AND GARLAND GAS RANGES *the most modern on the market*

Automatic Lighter for Oven Burner

gas pilot type



• With this lighter installed on the range, the burner lights by merely turning on the oven valve. No matches are needed. A small pilot flame is maintained, which, through the use of a trailer arm inside of the broiling compartment, automatically takes care of the lighting each time the oven valve is turned on. Equipped with safety device which prevents gas from flowing to the burner unless pilot is lighted.



Automatic Lighter for Oven Burner

Electric type

• Burner lights by simply turning on the oven valve. When valve is turned to "on" position, electric coil glows and ignites a small gas pilot flame. After the gas pilot flame is lighted, the mechanism automatically permits gas to flow to the main oven burner, which is lighted by pilot flame. Equipped with safety device. Economical to maintain.

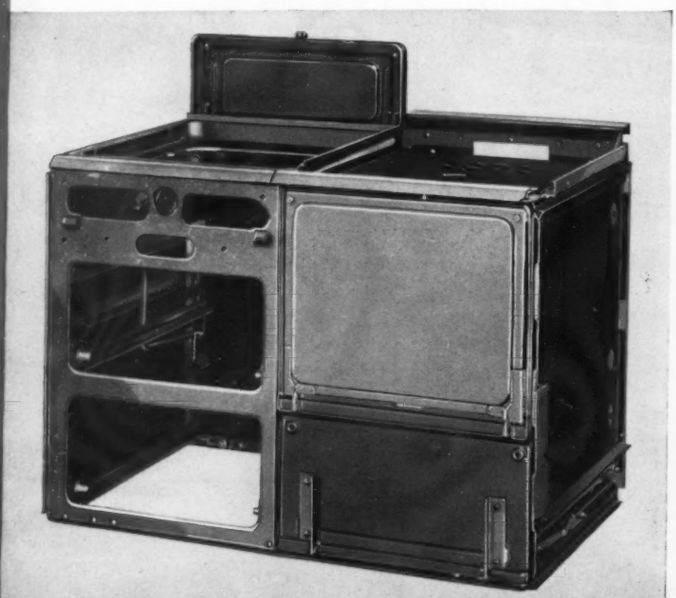
Ceramic Broiler Burner

• Because they are healthful and appetizing, broiled foods have rightfully become most popular. Now, with this new ceramic broiler burner, broiling is easier, quicker, and better results are attained. The burner flame is directed on the ceramics, producing an intense heat, which enables the broiler to be used very quickly after ignition. This is a valuable timesaver, for less time is required to heat up broiler before using it than in ordinary broiling ovens.

Exceptionally even heat distribution is obtained through the scientific design of this new burner. Temperature is evenly balanced under all parts of burner, with no hot or cold spots. The radiant heat penetrates the food, cooking the inside as well as the outer surface. Therefore, foods are evenly broiled and are uniformly delicious to the taste, as well as delightful to the eye.

Built like a skyscraper, for years of service

• A close examination of all parts of these fine ranges shows superior construction, both in design and production. Materials of highest quality only are used. Strength far beyond ordinary needs has been provided. Their rugged construction guarantees them long life and durability, with minimum maintenance expense.

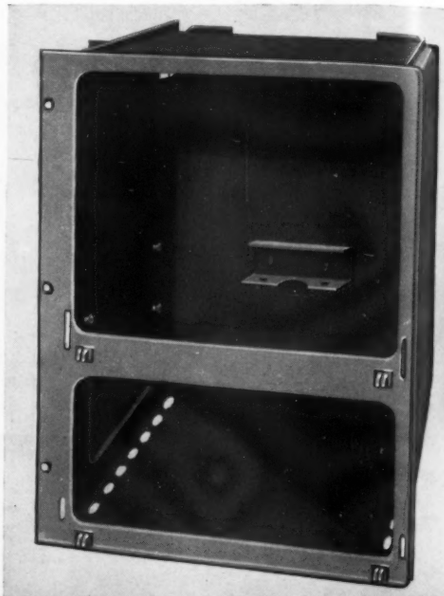


Frame construction

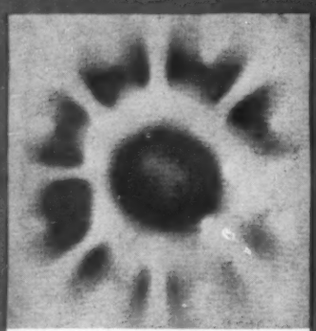
(Left) The frame is of very strong construction, assuring permanent rigidity and freedom from sagging or wobbling. The frame illustrated is the Junior Table Model, typical of the rugged construction throughout the complete line of gas ranges.

One-piece, welded, porcelain-lined oven

(Right) Rack slides may be easily lifted from the oven for cleaning. With these parts removed, the oven presents a smooth surface of porcelain enamel, with all corners rounded—readily accessible for easy cleaning.

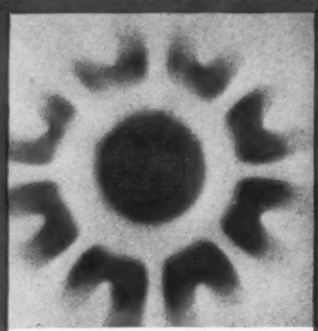


Compare these features with those of



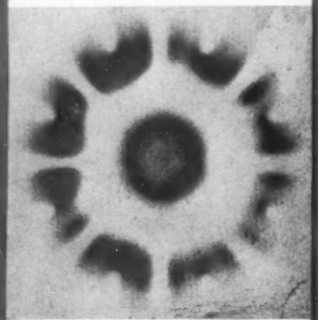
Top burner A

Note hot spot and uneven distribution.



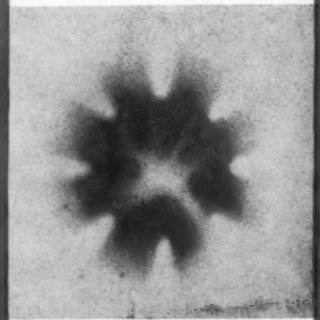
Top burner B

Note hot spot and uneven distribution.



Top burner C

Note hot spot and uneven flame spread.



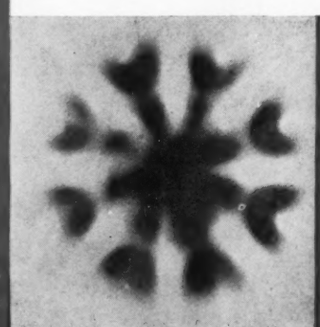
Top burner D

Note hot spot and limited flame spread.

Proven superiority of Detroit Jewel and Garland top burners

•. Actual tests to obtain a comparison in speed and fuel economy definitely prove Detroit Jewel and Garland top burners superior.

Reproduced here are actual unretouched photographs of asbestos pads which have been placed over top burners of four other makes of gas ranges, as well as the Detroit Jewel and Garland. In the lower right-hand corner of this folder are shown results of a similar test made on the same burners turned to a low flame. In all cases, the even spread of heat over the burner of the Detroit Jewel and Garland is definitely better.

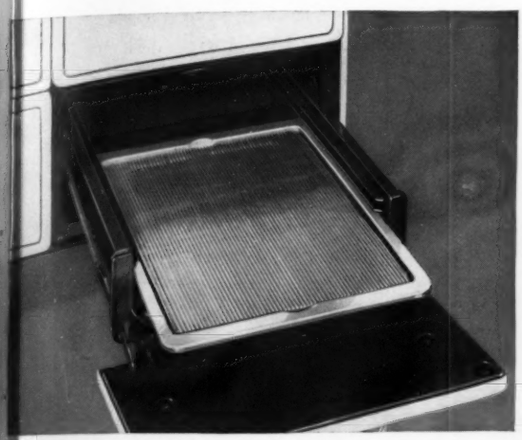


Detroit Jewel and Garland

Top burner—even distribution.

These features mean easy, pleasant operation

• Kitchen duties are far easier with these worth-while features. This applies not only to range operation but also to cleaning the range after use. Convenience to the housewife has been given every consideration in the designing and building of these modern gas ranges.



Drawer type smokeless broiler

Entire broiler is of drawer type, which rolls out. Chrome finish, large capacity grill provides smokeless broiling. Food is seared on lower side while flame sears the upper side, thus sealing in juices.

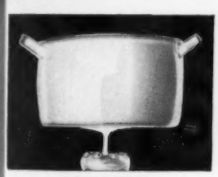
Sanitary oven tray

(Below) Here is a great convenience—oven bottom tray is porcelain finished and slides out easily for cleaning. Far easier to keep clean and shiny than the ordinary type of oven bottom.

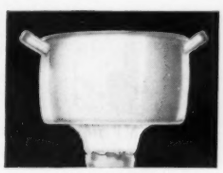
Cover top

The top rolls back smoothly and easily on roller bearings, from closed to open position. It also serves as a splasher back for cooking top. Gliding in concealed tracks, the cover top is held in alignment at any position.

any other gas range on the market



SIMMER



PARTIAL

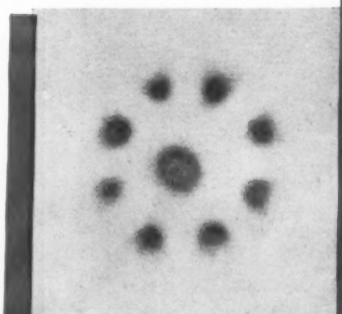
FULL

Any size flame is available

• *The illustration at top left* shows only simmer burner operating. Sufficient heat is produced by the simmer burner to keep ordinary utensils at boiling temperature, resulting in substantial fuel savings.

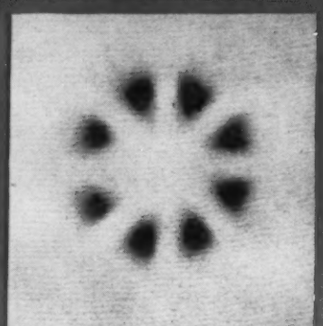
Center illustration shows top burner on at about one half of capacity. The flame is evenly distributed under the utensil for better cooking. The efficient arrangement of the ports permits the operator to adjust the flame properly for use with large or small utensils.

Illustration at top right shows the intense heat, well spread and distributed under the utensil, that may be had when desired.



Detroit Jewel and Garland

Top burner—even distribution at low flame.



Top burner B

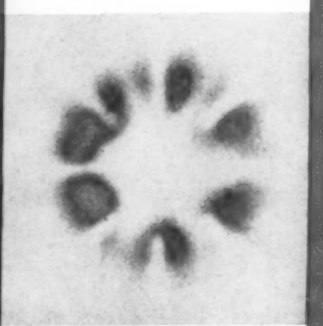
Uneven distribution at low flame.

Top burner A

Uneven distribution at low flame.

Top burner D

Uneven distribution at low flame.



Top burner C

Uneven distribution at low flame.

Detroit Jewel and Garland Gas Ranges
—excel in beauty and performance

● Here is 1936's most popular line of gas ranges—embodying beyond comparison, all the elements necessary to create and sustain a profitable, steady, record-breaking volume of business. Public acceptance has clearly designated these Detroit Jewel and Garland Gas Ranges as the units of excellence by which the American housewife measures values in selecting cooking appliances today. They are fitted to today's market. Not only is their visible superiority outstanding, but of like superiority throughout is their engineering and craftsmanship.

DETROIT JEWEL
No. 6627

DETROIT JEWEL
No. 6612

DETROIT JEWEL
No. 6671

DETROIT JEWEL
No. 6604

GARLAND
No. 3627

GARLAND
No. 3612

GARLAND
No. 3671

GARLAND
No. 3604

This Is Our Creed—

● To build a product so attractive in appearance as to delight the owner's eye, so durable as to provide years of lasting service, and so fairly priced as to meet the most exacting buyer's standard of value.

To so pursue our dealings with our trade as to insure a long and profitable association; to co-operate in mutual understandings for the benefit of all; and to so conduct ourselves as to erect a monument of friendly feeling as lasting as eternity.

This, for a period of seventy years, has been the purpose to which we have dedicated all our thoughts, our resources, and our skill.

DETROIT-MICHIGAN STOVE CO.

Detroit, Michigan

FIG. 3. Showing arrangement of sampling tubes and the subjects seated at table in test room.

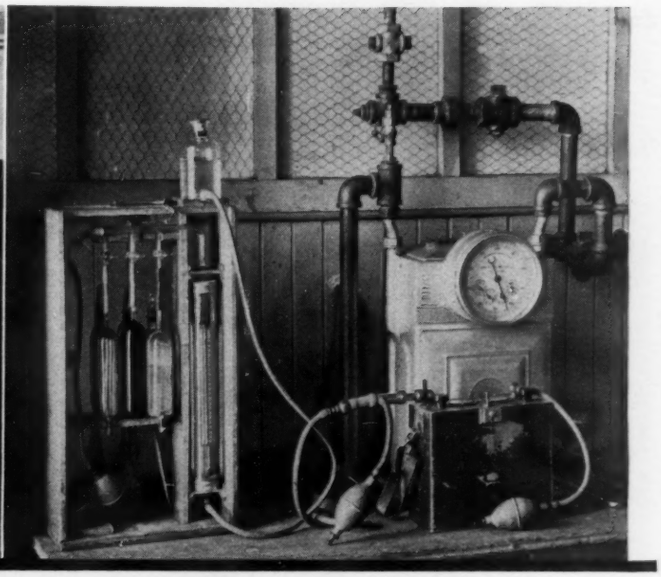


FIG. 4. Apparatus for controlling release of natural gas into test room, and for testing room atmosphere.

out and were killed and thorough autopsies were carried out by a competent pathologist. He found them normal in every respect.

The changes in weight and red blood count are as follows:

	WEIGHT IN POUNDS		RED BLOOD CELL COUNT	
	Before	After	Before	After
1.	5	4⅝	4.9	6.7
2.	6½	5¾	4.8	6.9

These changes can be entirely accounted for by the lowered oxygen tension to which the animals were subjected. The gas diluted the air to the extent of 30 per cent, so that the oxygen percentage in the air breathed must have fallen to about 15 per cent. This alone would have caused the slight drop in weight and the marked rise in the red blood count. Fig. 1 shows a view of the test tank.

Experiments on Humans

These were conducted at the plant of the Los Angeles Gas and Electric Corp. in a room that was completely isolated and where every precaution could be taken for safety. The dimensions of the room were 13 feet by 11½ feet by 10 feet high. It was made reasonably air tight and a small amount of gas was run in constantly to maintain the concentration which would otherwise fall as a result of seepage. Analyses for gas and oxygen were carried out constantly and the proper concentrations were maintained throughout. Four subjects, two students and two gas company employees, were exposed for two hours to a concentration of 25 per cent gas in air. A thorough physiological examination was carried out on them, before, during and after the exposure.

Subjectively the men experienced no symptoms except the smell of the gas, and a sense of mild exhilaration. No after effects were experienced; no disturbances of appetite or eating. Vision was tested by the standard methods and no change at all was found.

The ability to maintain an absolutely upright position is an important physiological mechanism. It involves many important sense organs like the muscle and joint senses, the eyes, the balancing mechanisms of the ears, and naturally the central nervous system. Any slight impairment of the nervous system will be evidenced by increased wobbling in attempting to maintain the perfectly upright position. We can record this graphically by a writing lever attached to the subject's head and which records on blackened paper above him. We did this and found no change in the ability to stand upright, as shown by the accompanying typical chart, Fig. 2. We tested the mental processes with sums in addition. No change in the time taken to do the addition, nor a tendency to make mistakes, was noted. Body temperature and respiration were not affected by the exposure.

The heart and circulation were checked by the following tests: pulse rates, blood pressures and electro-cardiographic records. The electro-cardiographic records were normal throughout.

FIG. 5. Electro-cardiograph test applied for heart action of the man both before and after exposure to the natural gas.

PULSE RATES

Subject	Before Exposure	After Exposure of ½ Hr.	1 Hr.	2 Hrs.
A	68	72	66	66
B	72	72	72	72
C	96	84	78	78
D	84	72	66	72

BLOOD PRESSURES

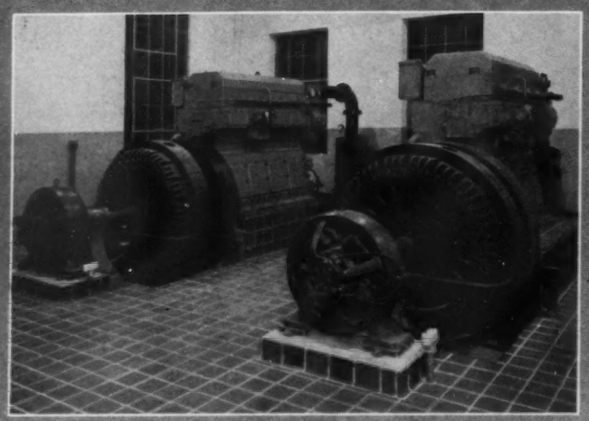
Subject	Before Exposure	After Exposure of 1 Hr.	2 Hrs.
A	108	104	—
B	118	112	106
C	160	128	—
D	138	110	112

In the cases of subjects C and D we see elevated pulse rates and blood pressures before the tests, which came down to normal in the gas-air chamber. This was undoubtedly due to apprehension on their part before the test, which was removed as they realized the harmlessness of the procedure.

The kidneys were tested and were quite unaffected. Blood samples were

(Continued on Page 55)

Will the Cooper-Bessemer



Cooper-Bessemer vertical four-cylinder Type-GN 200 H. P. gas engines furnish the auxiliary power to pump water, generate power for lights, and compress air in these compressor stations.

Here is another huge utilities project which is being built to serve not only this but future generations. Not a dollar is being saved on the construction of the Panhandle Eastern gas line to Detroit which will in any way shorten the life of the line or decrease the reliability of the service. The best of everything is being used with the idea that it will serve more than one generation.

One example is the Cooper-Bessemer compressors. No one knows how long they

The Cooper-Bessemer Corporation —

25 West 43rd Street, New York City

Mills Building, Washington, D. C.

640 East 61st Street, Los Angeles, Calif.

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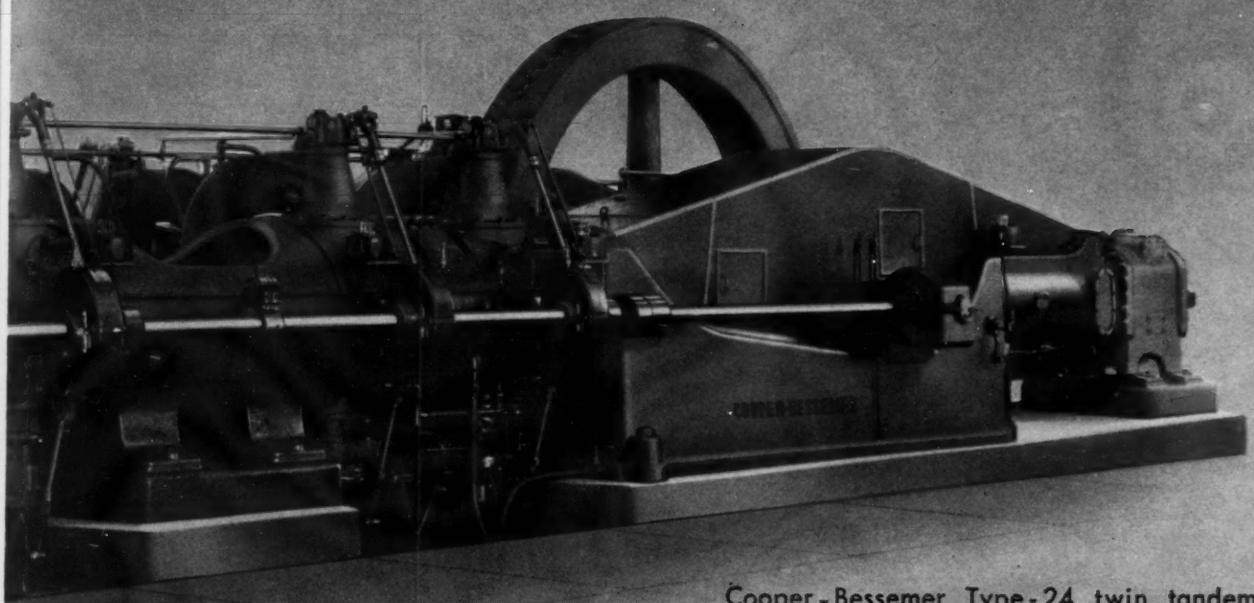
Compressors Outlast the Pipe Line?



Cooper-Bessemer Type-24 twin tandem 1300 H. P. gas engine driven gas compressor. It weighs 193 tons.

will last. The first one of this general type built in 1909 has been compressing gas ever since. The modern 1300 H. P. twin tandem Type-24 compressors built for this line are superior in every detail to that first one built nearly thirty years ago.

Many years of specialization have enabled us to constantly improve the design, choose more suitable materials and do a finer job of construction. Nothing can replace experience in a field where equipment is expected to last so long or prove so reliable.

Mt. Vernon, Ohio, Grove City, Pa.

631 Spring Street, Shreveport, La.

Magnolia Building, Dallas, Texas

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— L. W. Rogers, 6 Finsbury Square, London, E. C. 2

James F. Pollard, president of Seattle Gas Co., was elected to head the Pacific Coast Gas Association for the year 1936-1937.

P.C.G.A. Convention Attendance Sets All Time Record

By ARTHUR ROHMAN
Assistant Editor, GAS

TODAY there are many pleasant memories resting in the minds of 656 registered delegates who attended the 43rd annual convention of the Pacific Coast Gas Association at San Francisco's Fairmont Hotel on Knob Hill, August 25, 26, 27 and 28. In those crowded hours between the opening address of President H. M. Crawford Tuesday morning and the docking of the excursion boats that took delegates on a harbor tour for a close-up view of San Francisco harbor's two mammoth bridges late Friday afternoon, transpired many events.

To name one event as outstanding would be unjust; to describe all would fill a volume. Prominent in the convention pattern were the address of President H. M. Crawford, James F. Pollard's recapitulation on the accomplishment of a gas industry national advertising campaign; the thoughtfulness and service rendered by the convention's host, the Pacific Gas and Electric Co., the conviviality at the group luncheons, the stirring view from the Fairmont of the bay with the fog-shrouded towers of its great bridges, and the convention's finale, the annual banquet held in the main dining room of the hotel.

Convention registration, incidentally, was a new high for the Association, exceeding the 1930 peak of 566 by 90.

At 10:30 Tuesday morning President H. M. Crawford formally opened the sessions, introducing an interesting skit, "The Streets of San Francisco (Bringing the Streets to Life)" which formed a fitting prologue to the address of welcome extended the convention by James B. Black, president of the Pacific Gas and Electric Co.

Salient point in Mr. Crawford's presidential address was the great need for unified action among the industry's three divisions — dealer, manufacturer, and utility—in meeting the advances of competitive fuels. And in establishing this harmony and cooperation, he emphasized, the utility should lead the way.

Passing to the official business of the opening session, President Crawford introduced Chairman G. P. Egleston of the Nominating Committee, who presented the following names to serve as officers of the Association for the year 1936-1937. Election was unanimous.

For President: James F. Pollard, president and general manager of the Seattle Gas Co.

For Vice-president: Norman B. McKee, vice-president in charge of sales, Southern Counties Gas Co., Los Angeles.

For Treasurer: David G. Martin, auditor, Pacific Gas and Electric Co.

For Managing Director: Clifford Johnstone.

For Directors: W. J. Bailey, Day & Night Water Heater Co., Monrovia; H. L. Farrar, president, Coast Counties Gas & Electric Co., San Francisco; C. R. Graham, Jas. Graham Mfg. Co., Newark; and R. A. Hornby, vice-president, Pacific Lighting Corp., San Francisco.

President Pollard appointed the following general section chairmen to head the active committee work for the coming year:

Technical Section: Otto Goldkamp, foreman, gas meter shop, San Diego Consolidated Gas & Electric Co. A. B. Allyne, chemist, Southern Counties Gas Co., was appointed vice-chairman of the Technical Section, a new office.

Sales and Advertising Section: Bert W. Reynolds, manager of dealer sales promotion, Pacific Gas and Electric Co.

Customers and General Accounting Section: J. Q. Ewing, ass't auditor So. Calif. Gas Co.

Special committees will be headed as follows:

Educational Committee: H. T. Brian, supervisor, employee education, So. Calif. Gas Co.

Women's Committee: Doris Allen, sales and advertising dept., Los Angeles Gas & Electric Corp.

Cooperative Advertising Committee: A. C. Joy, advertising manager, Pacific Gas and Electric Co.

At the meeting of the Manufacturers' Section on Wednesday afternoon it was unanimously voted to continue all officers in their present positions, making the manufacturer's official set-up the following for the year 1936-1937:

General chairman: W. J. Bailey, Day and Night Water Heater Co., Monrovia.

General Vice-Chairman: Clarence R. Graham, James Graham Mfg. Co., Newark.

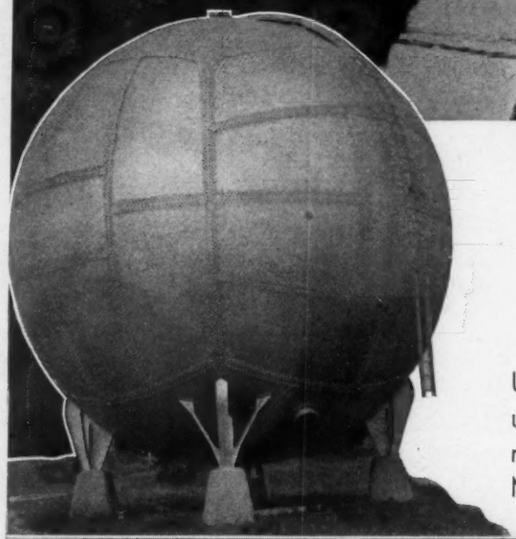
Furnace Division: Chairman, R. G. Logue, Ward Heater Co., Los Angeles. Vice-Chairman, W. W. Norton, Electrogas Furnace & Mfg. Co., San Francisco.

Range Division: Chairman, W. C. Gaffers, Gaffers & Sattler, Los Angeles. Vice-chairman Geo. Hammer, Hammer Bray Co., Oakland.

Water Heater Division: Chairman, R. C. Hoyt, Hoyt Heater Co. of Northern Calif., Oakland. Vice-Chairman, Wayne R. Smith, Continental Water Heater Co., Los Angeles.

Space Heater Division: Chairman, A. J. Hartfield, Pacific Gas Radiator Co., Huntington Park. Vice-Chairman, J. S. Andrews, Andrews Heater Co., Los Angeles.

To return to the general session of Tuesday afternoon, M. D. Lack, manager of the Tax



"ACE HIGH"

The High Water Resistant Qualifications of NO-OX-ID Coatings Are Recognized

Use of NO-OX-ID for protection of valuable investments is universal. On major pipe lines, under the most extreme corrosive conditions of soil and electrolysis, the NO-OX-ID Master Coat gives positive protection.

NO-OX-ID may be readily applied by hand or machine methods under an exceptionally wide range of conditions, because it is especially designed to chemically take care of excessive moisture and steel surface conditions. NO-OX-ID does stop loss from rust.

Dearborn Chemical Company is equipped to make or assist in making soil surveys and furnish recommendations to cope with conditions indicated. Our Chemical Engineering staff with field experience is at your service. Write for recommendations and estimates.

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205 E. 42nd St., New York

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807 Mateo Street
Phone TRinity 3385

San Francisco:
421 Bryant Street
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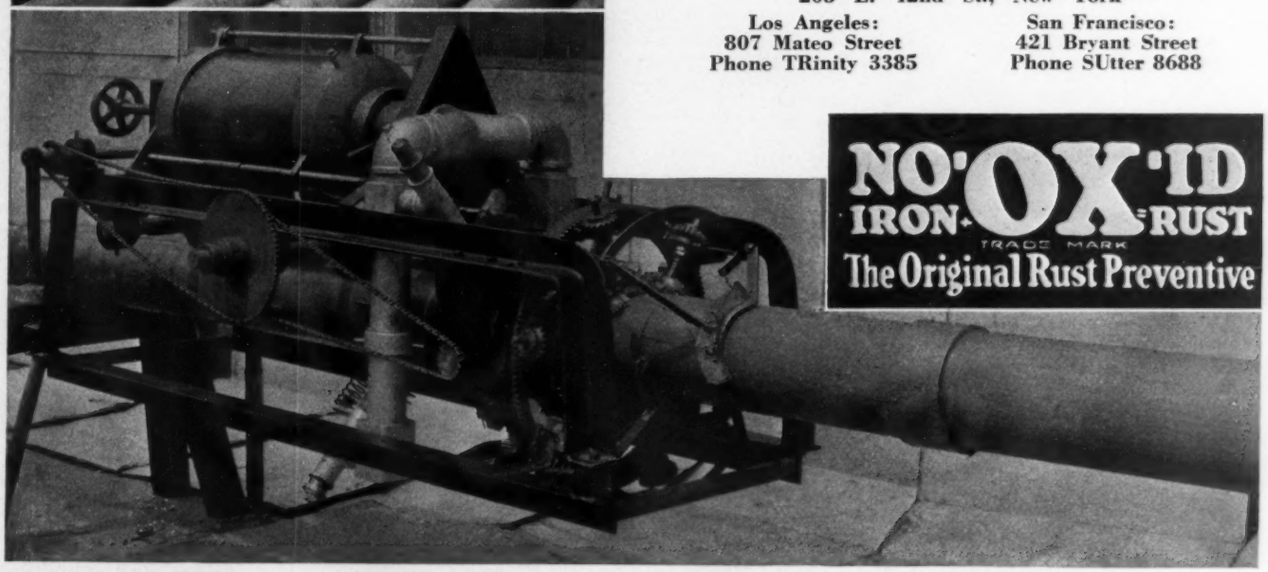
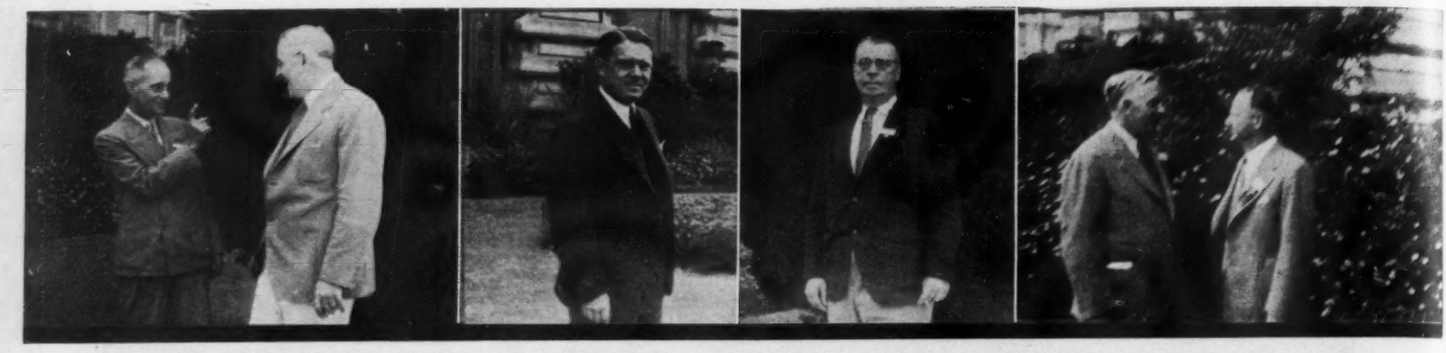


NO-OX-ID
IRON + OX = RUST
TRADE MARK
The Original Rust Preventive



GEORGE WEHRLE, Public Service Co. of Colo., puts over a point with W. P. HUTCHINSON of Sprague Meter Co. H. N. RAMSEY, president of the Welsbach Co., represented A. G. A. E. M. H. W. BOYNTON, vice-president and manager, Honolulu Gas Co., was the westernmost attendant. H. R. BASFORD, president of the H. R. Basford Co., snapped with FRANK TALCOTT, P. G. and E. division sales manager.

department, Pacific Gas and Electric Co. rendered a thoroughgoing account of the effect of California's new utility tax system during the past two years. The paper presented by D. R. Drury, Professor of Physiology at the University of Southern California, on "Physiological Effects of Natural Gas" was awarded Honorable Mention and is reproduced in another part of this issue. Laurin Hinman, executive assistant to the president of the Portland Electric Power Co., in his paper "Human Engineering—the Salvation of Industry" pointed out that to formulate a favorable mass opinion the gas industry must present an emotional rather than logical statement of its case against competitors and against government coercion. "What Women Want to Know" was very aptly told in one sentence by Genevieve Callahan, editor of Sunset Magazine. Women want the gas industry to tell them "how to be good cooks and housekeepers without looking, talking, and feeling like cooks and housekeepers."

Climax of the Tuesday afternoon General Session was the address of incoming president James F. Pollard on "National Advertising at Last." Mr. Pollard's address commended the Committee on National Advertising for its success in organizing the campaign within the short space of one year. Suggested by the Pacific Coast Gas Association, the advertising campaign met with the approval of the A.G.A., and a swift-moving committee without delay sold companies controlling over 70 per cent of the active meters in the country on the idea of appropriating 4 cents per active meter to make up an advertising budget of $500,000 per year for a three-year period. In quick succession the committee formulated a theme, selected an advertising agency, okayed copy tactics, and released the first full page advertisement in nationally circulated magazines this month. Mr. Pollard's address was a fitting climax to a great objective brought to a successful conclusion in record time. For his own leadership in bringing the national campaign into being Mr. Pollard was voted the Association's gold medal award.

At the Thursday morning General Session W. J. Bailey, general chairman of the Manufacturers' Section, made clear to the membership the new set-up between the Manufacturers' Section of the P. C. G. A. and the A. G. A. E. M. He further announced that the Manufacturers' Section had unanimously voted to raise its dues to more adequately compensate for the service rendered the Section by the Association. As a further presentation of the manufacturers' viewpoint, H. N. Ramsey, president of the Welsbach Co., read a message from W. T. Rasch, president of the Association of Gas Appliance and Equipment Manufacturers, elaborating on the affiliation agreement between the Manufacturers' Section of the Pacific Coast Gas Association and the Association of Gas Appliance and Equipment Manufacturers.

High light of this closing general session was the gold medal paper of B. W. Reynolds, manager of dealer sales promotion for the Pacific Gas and Electric Co. Mr. Reynold's paper, "Guiding the Sales Program", by charts and a statistical presentation narrowed down the sales field and the types of appliances which should be stressed for specific markets. The paper will be given complete treatment in a forthcoming issue of *GAS*.

"Gas Rate Economics" by W. G. Vincent, Jr., vice-president and executive engineer, Pacific Gas and Electric Co., was a valuable contribution which will be treated in an early issue.

At this point, Wayne Smith of the Resolutions Committee presented to the membership the following resolution:

"The Pacific Coast Gas Association especially endorses that part of the address of President H. M. Crawford which calls upon the industry for more research in gas utilization. We believe that research is essential to the continued progress of the Industry and that it should be directed not only toward the improvement of gas-burning equipment but also toward the development of new fields in which gas can be of service. Every available agency should be utilized to these ends including the laboratories of gas companies, of gas appliance manufacturers and of the American Gas Association."

Association Big-Wigs: Incoming President Jim Pollard, Managing Director Cliff Johnstone, Retiring President Hugh Crawford.

Finale of the Thursday morning General Session was a showing of the motion picture produced jointly by the three Los Angeles gas companies, "The First Twenty Million Years."

The Technical Section held its usual busy sessions, which occupied an evening and two afternoons. At these meetings the reports already printed in the August issue of *GAS* were briefed and discussed by the authors, and several additional reports, too late for printing, were also presented. Considerable use was made of lantern slides, the discussions were lively, and the meetings were of high value and interest.

The Utilization Committee meeting was called to order by Guy Corfield, Los Angeles Gas and Electric Corp., Chairman, on Tuesday evening. Mr. Corfield reported an active year for this Committee, briefly reviewed the program at the Regional Conclave at Los Angeles last March, and urged continued and vigorous support from the membership to this important utilization work. He continued with a progress report from C. A. Thorp, Los Angeles Gas and Electric Corp. chairman of the subcommittee on "Gas Lighting," describing the subcommittees' investigations of mantle life as affected by such variables as type of lamp, type of gas, location, vibration, and burning-in procedure. Light output in relation to age of mantle was discussed, as was also the economics of gas street lighting from a study of a street section four blocks long, as lighted by various means in accordance with accepted standards of light intensity and with consideration to investment, taxes, operation and maintenance. This work on gas lighting will be continued during the current Association Year. C. B. Babcock, president, C. B. Babcock Co., discussed the report, cited progress in gas lighting installations, and described recent and pending improvements in design.

N. L. Hoff, Los Angeles Gas and Electric Corp., next presented a paper on "The Flow of Gas in House Pipes," providing a simple method of calculation for the benefit of build-

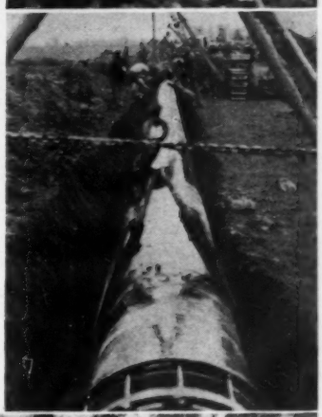
COMPLETED SEVEN DAYS AHEAD OF SCHEDULE!

. . . . the 174 MILES of the DETROIT LINE Laid by BIBB CONTRACTING COMPANY

When contracts were let on the Detroit pipeline, Bibb Contracting Company brought one of the greatest arrays of modern pipeline equipment ever assembled into action on the Southern and Central sections.

Sixty-five pieces of heavy duty equipment—Diesels . . . Gas Tractors . . . Ditchers . . . Backfillers . . . Clam Shells . . . Drag Lines—went into service on the two sections. All pipeline in Indiana and Ohio—174 miles of the 230-mile total length—was included in the two sections.

Five multiple river crossings added to the many difficulties encountered. Yet the construction program was completed seven days ahead of schedule.



Illustrations show a few of the many pipeline operations involved in laying the Detroit line and suggest some of the construction problems encountered, such as wet terrain . . . caving ditch . . . necessity for hand labor in badly caving areas, etc.

Bibb Contracting Company
DALLAS TEXAS

NATURAL GAS GOES

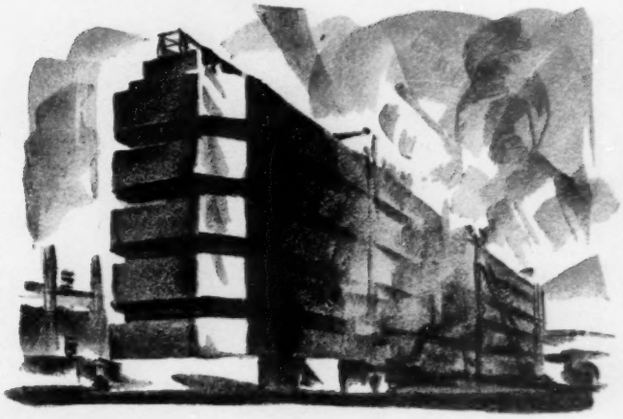
The construction of approximately 1145 miles of Panhandle Eastern Pipe Line Company's natural gas pipe line from the Texas Panhandle to Detroit, Michigan, represents a major achievement in gas engineering and distribution.

T O T O W N

The Gas Industry has been a dominant factor in the economic and social advancement of this country by bringing energy with infinite potentialities to homes, factories and farms. Significant of its further progress is the announcement of the completion of Panhandle Eastern Pipe Line Company's new lateral from near Indianapolis, Indiana, to Detroit, Michigan.

The Fluor Corporation, Ltd., as constructors and engineers to the gas industry played an active part in Panhandle's project. Eight of the compressor plants are Fluor-built; all cooling towers, eleven in number, are of the Fluor aerator type, and all new engines are equipped with Fluor air-cooled exhausts and mufflers.

Fluor Aerator Type Cooling Towers and Air-Cooled Mufflers have, ever since their introduction, been recognized as leaders. For a period of over forty-four years, Fluor engineering and construction service has kept pace with the steady progress of the Gas Industry.



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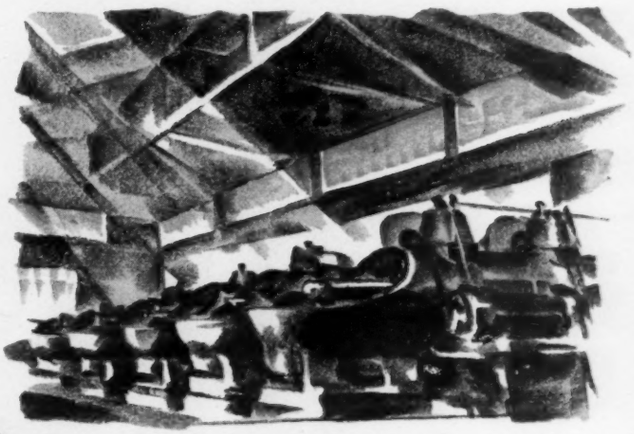
Eleven Fluor Aerator Type Cooling Towers have been built along Panhandle's pipe line. These atmospheric cooling towers are of the coil type and are used for cooling hot gas as well as compressor plant jacket water.



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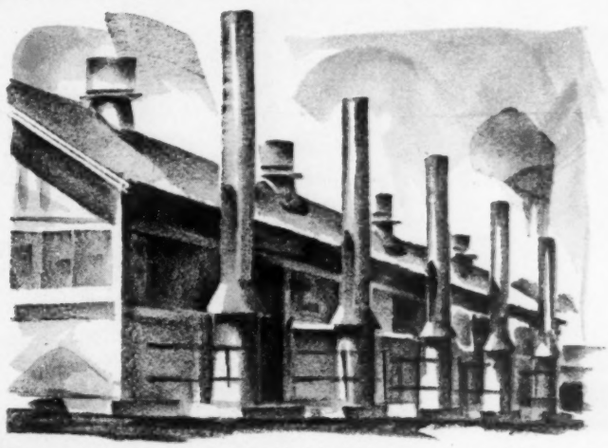
Eight of the compressor plants are of Fluor design and construction. These plants are typical of Fluor engineering and construction service to the gas industry.



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The twenty-five new 1300 H. P. gas engine driven compressors are equipped with Fluor Air-Cooled Mufflers. Heating the engine rooms during cold weather and cooling them during warm weather are new features which help greatly to reduce operating costs.

THE FLUOR CORPORATION, Ltd.

BE SURE WITH FLUOR

909 EAST 59th STREET, LOS ANGELES, CALIFORNIA
703 Fairfax Bldg., Kansas City, Mo. • 719 McBirney Bldg., Tulsa, Oklahoma • 909 McCormick Bldg., Chicago, Ill. • 30 Church St., New York City, N. Y. • • 1402 Esperson Bldg., Houston, Texas

Surrounded with flowers are MRS. H. M. CRAWFORD (convention hostess) and daughter, GEORGIANA. Under the big white hat is CAPT. A. E. HIGGINS, representing the A. G. A. P. M. DOWNING, vice-president and general manager of P. G. and E., snapped at the Lakeside Country Club. From Belgium came A. BRUYOUX of Merco-Nordstrom; from Pittsburgh, COL. W. F. ROCKWELL, president of Pittsburgh Equitable Meter Co.

ers and plumbers, which paper will be dealt with in an early issue of *GAS*. The chairman then introduced Professor E. D. Howe, professor of mechanical engineering, University of California, who gave a discussion on "Further Research on Flame Stability" in which he described a continuation of the work reported to the 1935 Convention under the title "Characteristics of Natural Gas Flames"; this paper on Flame Stability will also be treated in an early issue.

J. E. C. Currens and C. P. Perkins, Pacific Gas and Electric Co., presented their preprinted paper on "Equipment and Methods for Gas Service Training," by the use of display boards that formed part of their paper and were on view in the meeting room. As the final presentation at this meeting, Mr. Corfield briefed the printed report of the subcommittee on "Thermostats for Gas Space Heaters," by T. G. Wallace, chairman, Los Angeles Gas and Electric Corp.

The Wednesday afternoon Technical meeting was opened with a brief address by the Chairman of the Technical Section, P. E. Beckman, Pacific Gas and Electric Co., followed by the report of the Production Committee under the chairmanship of G. R. Horning, Seattle Gas Co. Otto Goldkamp, chairman of the Distribution Committee, then opened the program of his committee with a brief report, and introduced H. S. Harris, chairman of the subcommittee on "Breaking in Meters Before Final Adjustment of Proof"; considerable discussion followed this report, with arguments for and against the breaking-in procedure, some contending that it was well worth while, and others that it was an unnecessary expense. This paper will be given more detailed attention in an early issue. This was followed by a report by F. S. Honberger, Southern California Gas Co., dealing with "Advisability of Changing Gas Meters on Basis of Gas Passed." C. Eldon White next briefed the printed paper on "The Resistance of Pilot Lights to Air Currents."

The next paper, on "Economics of Unaccounted-for Gas," by F. A. Hough, Southern Counties Gas Co., will be covered at some length in an early issue. A. F. Bridge, of the same company, discussed the difficulty of obtaining accurate records of past leakage and of forecasting future leakage; it was brought out that installations of copper piping would reduce leakage in an amount disproportionate to the footage; that replacements could not always be justified for purely economic reasons; that leakage figures could be modified by other means, such as pressure reduction. M. T. Burton then followed with a review of "Combustible Gas Detectors" as now available, the thought being expressed that they are unnecessarily sensitive, and costly, for at least some types of distribution work.

Frank Pape, Pacific Gas and Electric Co., chairman of the subcommittee on "Modern Methods for the Installation of Mains and Services," next introduced H. F. Carr, of the same company, who discussed "Maintenance of Cast Iron Mains", showing by slides the installation of leakage clamps, and concrete leakage blocks. This was followed by a paper by H. V. Buffington, Los Angeles Gas and Electric Corp., read by Frank Pape, using slides and showing ways of erecting vehicular and pedestrian barricades, and installing Mueller pressure control fittings. A further illustrated paper was given by J. E. O'Brien, Pacific Gas and Electric Co., on "Replacement of Services Under Pavement" descriptive of a method of pulling copper tubing through old services, and making end connections. The final report was that on "Pressure Piping Code" by D. H. Perkins, San Diego Consolidated Gas and Electric Co.

Fire Demonstration

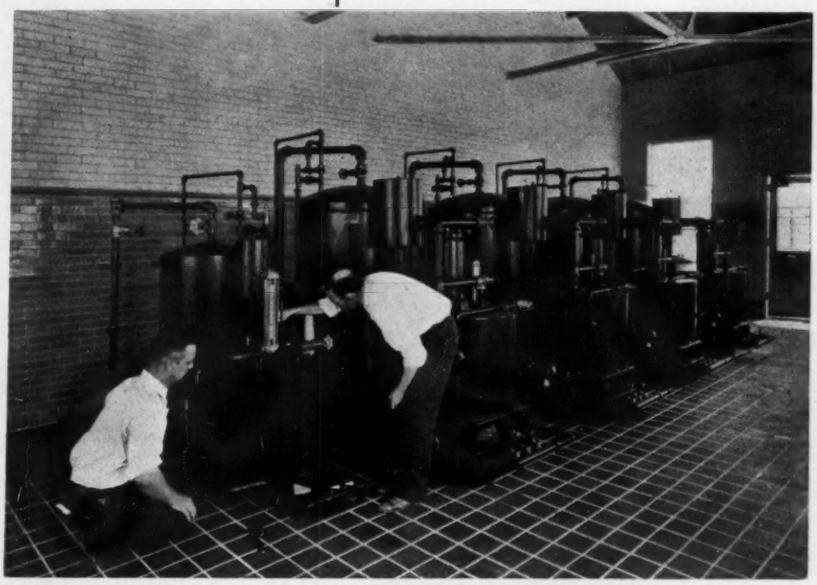
The meeting adjourned to the Eighteenth and Shotwell Streets yard of the P. G. and E., where a realistic and practical demonstration was made of a "Suggested Method of Handling Uncontrolled Gas Fires". Preliminary to the demonstration an indoor meeting introduced by S. C. Dickinson and conducted by J. E. C. Currens, detailed the manner in which employees are instructed in the chemical phenomena of fires, the difference between fires and explosions resulting from natural gas as opposed to other fuels and combustibles, leading up to the fact that it is relatively difficult to ignite wood with a luminous gas flame. In the event of a gas fire, therefore, and prior to the time when the gas can be turned off at the main back of the opening, it is much better and safer to allow the gas to burn, and prevent the flames from seriously igniting the surroundings, than to blow or flood out the fire at the risk of explosion of the continuously leaking gas which may subsequently be ignited. Following this lecture, a demonstration was supervised by Mr. Currens, wherein gas at a meter and regulator under a section of a house comprising front and side walls and floor, was ignited and the flames allowed to burn in considerable volume because of high pressure on the gas line. By the use of one small water hose, and some flattened ash cans, flames were diverted and the wood structure saved from ignition more serious than superficial charring. The demonstration was very convincing, and proved to the audience that an apparently serious gas fire could be kept well under control with materials available at practically any location, until a gas shut-off could be made. Firemen, as well as gas company employees, are given such demonstrations.

On Thursday afternoon A. B. Allyne, chairman of the Transmission Committee, presented a lengthy and varied program. All of the transmission papers but one appeared in the August issue of *GAS*, thus facilitating convention discussions. Mr. Allyne first introduced B. M. Laulhere, Southern California Gas Co., chairman of the subcommittee on "Compressor Plants and Pipelines," who in turn called on Fred E. Wilson, Pacific Gas and Electric Co., to brief his paper on "Leaks on Natural Gas Transmission Lines" and H. J. Smith of the same company to abstract his paper on "Clearance Pockets for Transmission Line Compressors." These were followed by "Gas Dehydration by Calcium Chloride Brine Method", presented by W. K. Dodd, Southern California Gas Co., and "The Internal Corrosion of Natural Gas Transmission Pipelines" by M. T. Burton of the same company.

C. P. DeJonge, San Diego Consolidated Gas and Electric Co., chairman of the Pipe Protection subcommittee, then called on H. J. Keeling, Southern Counties Gas Co., to discuss his paper on "Locating Accidental Contacts on Cathodically Protected Lines," and briefed a paper on "The Effect of Soils on Asphalt", written by D. R. Hiskey, Southern California Gas Co.; this latter paper, not appearing in the August issue of *GAS*, described tests showing how asphalts give off oils when laid in pellet form on white paper, which oils are absorbed by soils, or drawn out by soils, with consequent embrittlement of the asphalt.

Guy Corfield, Los Angeles Gas and Electric Corp., chairman of the "Natural Gas Calorimetry" subcommittee, next briefed his report, which included as a major contribution a paper by W. A. McGlashen of the same corporation, entitled "Effect of Atmospheric Humidity in Gas Calorimetry." This

WESTERN GAS OIL FOGGERS



WESTERN GAS oil fogging equipment installed at the Detroit City Gas Company's new River Rouge Regulator Station.

With oil fogging YOU will

1. *Keep unaccounted for gas losses at a minimum.*

2. *Materially reduce corrosion of mains and services.*

3. *Prevent dust troubles.*

4. *Receive a salutary effect on meter diaphragms.*

WESTERN GAS automatically controlled oil foggers give you the most effective and economical means of preventing service stoppages, pilot outages and a high "unaccounted for" resulting from the drying out of distribution systems caused by a change-over from saturated manufactured to dry natural gas.

WESTERN GAS automatically controlled oil foggers proportion the fog to rates which will coat and retain an oil film thruout the entire distribution system.

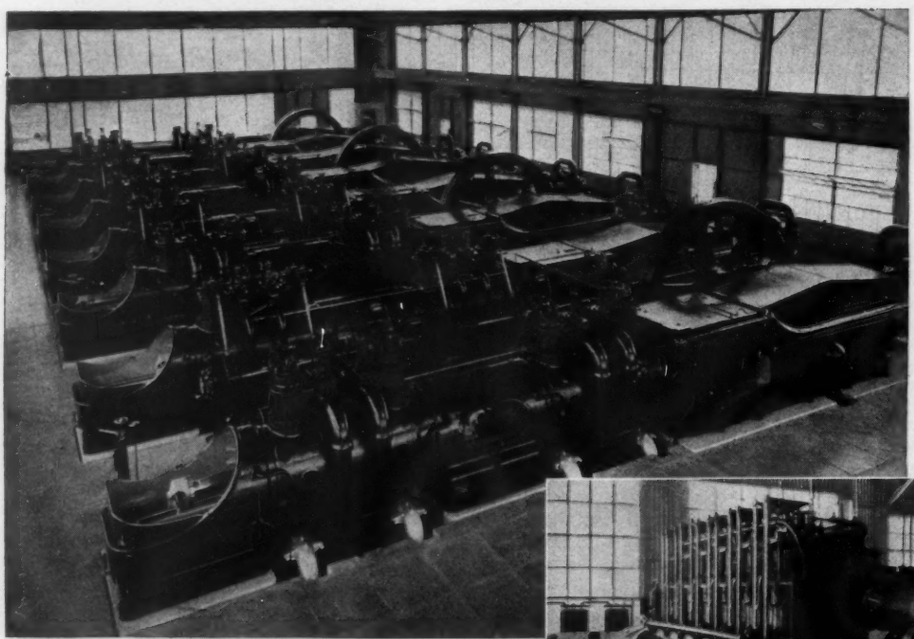
WESTERN GAS

CONSTRUCTION DIVISION OF
THE KOPPERS CONSTRUCTION CO., FORT WAYNE, IND.

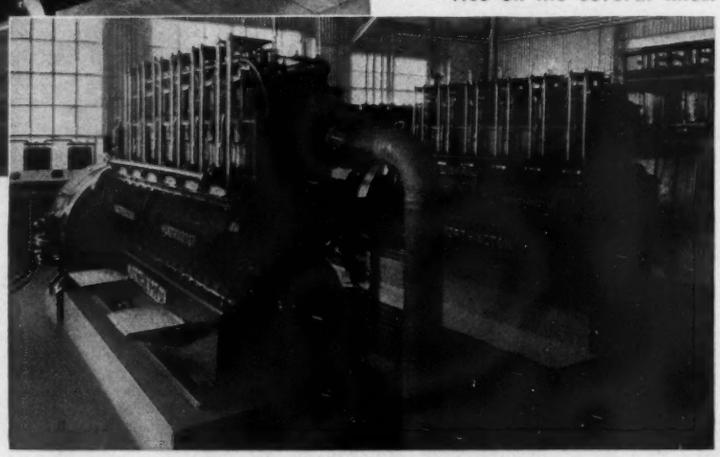
To Major Gas Companies in 1936.....

22 MORE WORTHINGTON COMPRESSORS ... 28,600 HORSEPOWER

Leading all other makers



Four Worthington 1300-hp. 24"x 36" Twin Tandem Compressors. This is the Southern Natural Gas Company's installation at Perryville, Louisiana. An additional unit now being installed.



Two Worthington 180-hp. Vertical Gas Engines... as installed for station service on the several lines.

WORTH

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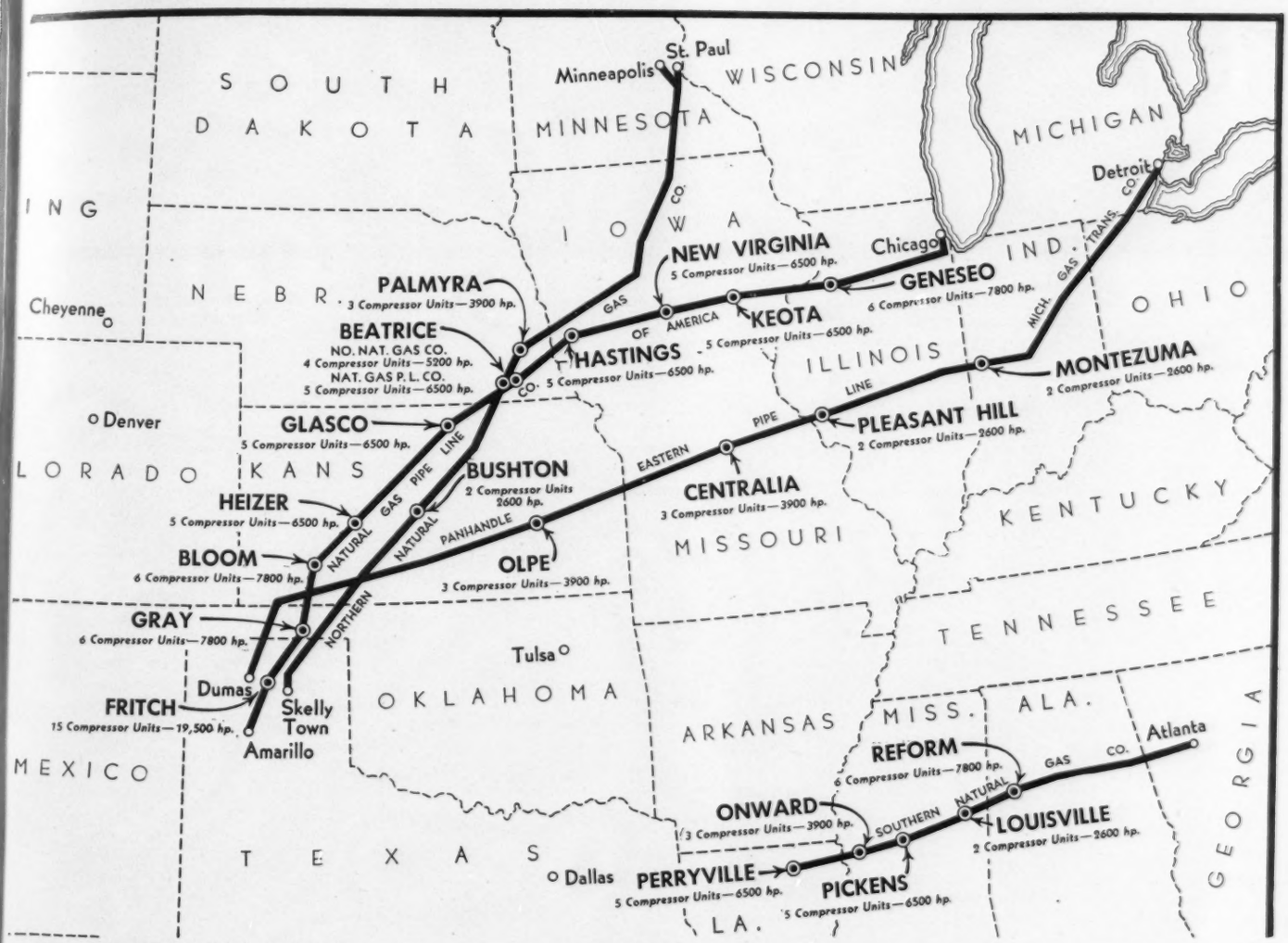


WORTHINGTON horsepower now installed on above lines totals 133,900.

The economy and dependable operation of previously installed units have earned this continued confidence in Worthington Gas Engine Compressors and the organization which produced them.

In addition to the main units on these lines, Worthington has supplied auxiliary gas engines for station service and other auxiliary equipment . . . all backed by the undivided responsibility of one maker.

WORTHINGTON PUMP AND MACHINERY CORPORATION

General Offices: **HARRISON, NEW JERSEY**

Branch Offices and Representatives in Principal Cities throughout the World

INGTON

P. G. and E. group—(left)—ROSCOE D. SMITH, civil engineer; T. P. JENKINS, distribution superintendent; R. S. Fuller, gas distribution engineer; J. A. LOVE, assistant construction engineer; E. E. MATHESON, and J. E. CURRENS, gas dept. engineer—(center)—HENRY BOSTWICK, manager of the San Francisco Division, was the able general chairman of the Convention Committee—(right)—E. C. WOOD, manager of transportation, with some of the P. G. and E. cars at the disposal of convention delegates.

was followed by the "Orifice Meter Standards" subcommittee report, E. H. Fisher, Coast Industrial Gas Co., chairman; Mr. Fisher presented his own paper on "Application of the Reynolds and Expansion Factors in Gas Measurement", following this with a paper entitled "Effect of Air Density on the Measurement of Specific Gravity of Gases" by R. P. Work of the same company. The Technical Section session was then adjourned.

The Customer Relations Conference, held Wednesday morning under the chairmanship of E. G. McCann of the P. G. and E. reviewed educational activities of Association member companies. R. R. Blackburn, supervisor of personnel, safety and claims, So. Calif. Gas Co., presented a paper on service sampling, while R. L. Eltringham of Pacific Gas and Electric Co. spoke on "Progress in Employee Training." In his paper on "Practical Educational Procedure," R. V. Davis of Los Angeles Gas and Electric Corp. stressed the importance of basic cooking instruction for service men as a means of alleviating customer complaints arising out of improper cooking. Frank Moon of Los Angeles Gas and Electric Corp. in his paper, "An Educational Program for Architects and Builders," stressed the importance of talking to the architect in his own language, of presenting him something of lasting reference value to interest him in gas appliances. As an entertaining finale to the customer relations program, Arnold Perstein, professor of Public Speaking, University of California, gave a whimsical and clever address, impressing upon the members that the solution to all customer relations problems lies within the utility organization.

The Accounting Section, under the chairmanship of Lester Green, of L. A. G. and E., was held in two divisions. The first on Thursday afternoon presented two papers given Honorable Mention. First of these was "Long Term Appliance Contracts" by C. T. Burns, Southern California Gas Co., a paper which stressed need for systematizing term contract practices and the accounting methods which they involve. The second paper, "Standardization of General Service Forms", by M. A. Seeley of the Los Angeles Gas & Electric, pointed out the many economies that an intra-company form committee can inaugurate in standardizing office forms. "Trends in Accounting Classifications" by D. G. Martin of P. G. and E. completed the first accounting session. The second meeting held on Thursday afternoon presented M. W. Gibson of the Seattle Gas Co. in a paper on "Customer Deposit Policies." The problem of customer accounting and its effect on public relations was the subject of O. L. Moore of L. A. G. and E. Complexity of payroll accounting under social security requirements was covered by L. W. Coghlan, Pacific Gas and Electric Co.

At the Manufacturers' Section, presided over by Chairman W. J. Bailey, president of the Day and Night Water Heater Co., were presented three papers valuable from the merchandising slant. To date no complete statistics on gas appliance sales are available, and the address of C. A. Swigart, trade relations representative of the Pacific Coast Gas Association, emphasized the importance of such statistics in charting the rise and fall of business activity among the manufacturers. Dr. F. E. Vandaveer, supervisor of the A. G. A. Testing Laboratory in Los Angeles, in tracing the trends in gas appliance design, gave numerous examples to illustrate technical short-comings of various appliances, and the need for basic research to improve efficiencies and performance. Captain A. E. Higgins, secretary of the A. G. A. Natural Gas Department, closed the meeting with suggestions as to how the A. G. A. blue star of approval might be effectively used as a merchandising emblem.

Sales and Advertising

Before the first Sales and Advertising Section meeting, called to order by Chairman W. M. Jacobs of Southern California Gas Co., many informative papers were presented. A plan for budgeting sales effort was offered by E. J. Strickland, Southern California Gas Co., and Frank Talcott, division sales manager, Pacific Gas and Electric Co., presented a well worked out plan for measuring the effectiveness of sales supervisors.

An important factor to gas salesmen during the past year has been the decided upswing in the building curve. In his paper, "Following New Construction for Sales", Lew Galbraith of the Pacific Gas and Electric Co., Oakland, contrasted building factors as they affected the selling of gas eight years ago with those of today. David N. Reid, P. G. and E., demonstrated that the following of turn-ons resulted in one sale out of 10 calls and that 20 per cent of domestic appliance sales were made by his company through leads from this source.

Three papers in the Advertising and Sales Section were devoted to home service. A report by Home Service Chairman Victoria Warner, Los Angeles Gas and Electric Corp., recapitulated the accomplishments of the home service departments of eight Pacific Coast companies during the past year. Beatrice Strege, home service director, Seattle Gas Co., gave conclusive evidence that luncheon cooking demonstration programs for women's organizations are an effective means of establishing a sales contact. Cooperation between the appliance dealer and the home service department was a topic offered by Gladys Price, home service director, Southern California Gas Co.

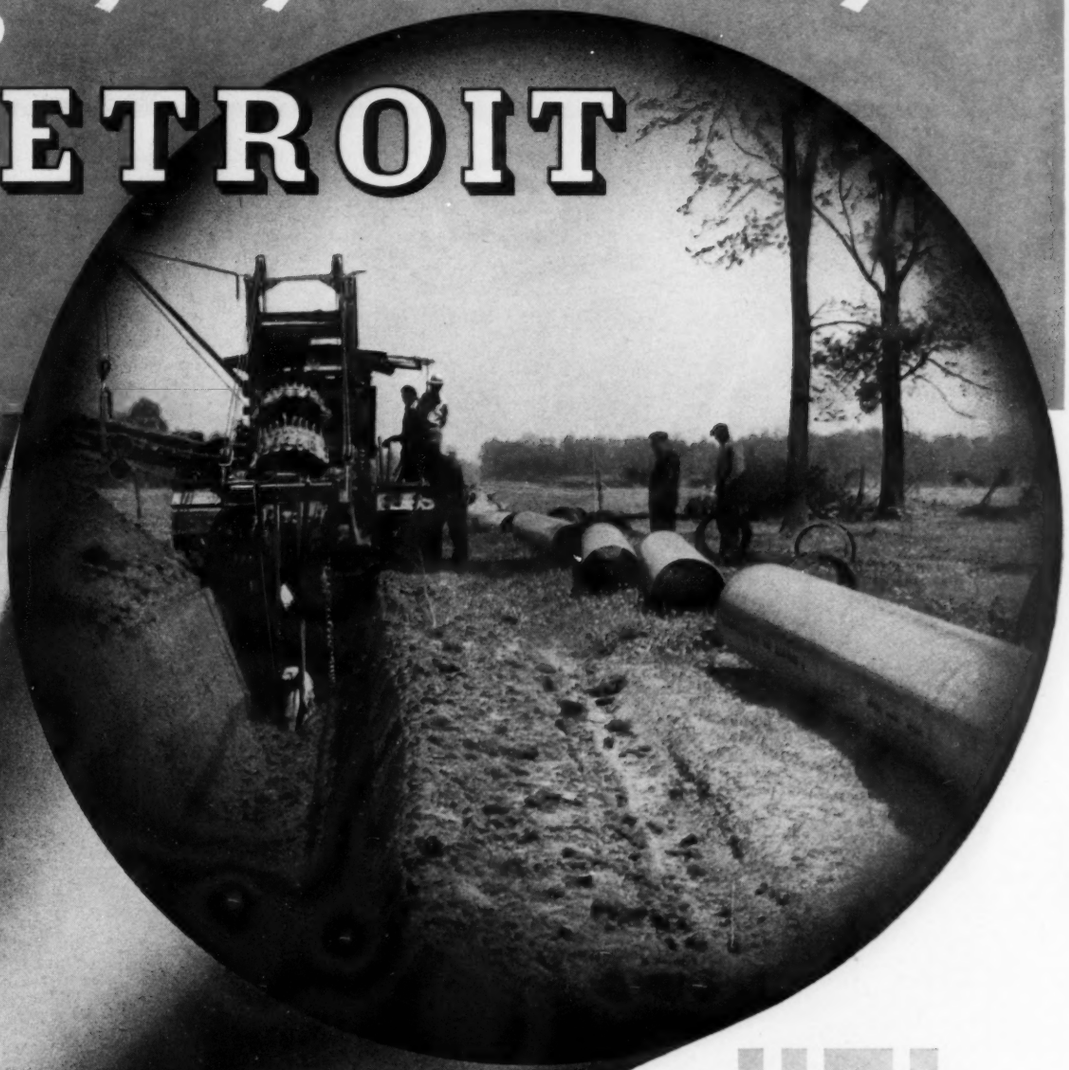
At the second meeting of the Sales and Advertising Section on Thursday afternoon, an entertaining analysis of advertising media by Forrest Raymond of San Diego Consolidated Gas and Electric Co. demonstrated the impossibility of applying a dollar-value yardstick to advertising. Mr. Raymond presented figures to disillusion the customer who believes that the cost of advertising increases his gas bill, and showed the direct relation between generous advertising budgets resulting in increased business, and lowered gas rates.

A. C. Joy of P. G. and E. led a discussion on the value of radio as a medium for gas promotion, resulting in the general conclusion that radio, for all its potentialities, is as unchartable as any other advertising medium. Morning programs to women have been successful, but overdone. Cultural programs in general have brought small response. The industry has made no extensive use of the comedy programs so popular with the masses. It was concluded that a good radio program is the best medium for getting the greatest response in the shortest time, if cost is not prohibitive.

To conclude the Sales and Advertising portion of the program, R. L. Grutzmacher of Natural Gas Equipment, Inc., chairman of the Industrial Sales Committee, introduced three excellent speakers. C. C. McRae of Pacific Gas and Electric Co. offered a compilation of engineering data useful in sales work. Ray Trowbridge of Seattle Gas Co. in his paper justified sales expense in securing small commercial loads. W. W. Howe of the Pacific Gas and Electric Co. closed the session with a study of the comparative value of gas and other fuels for heating commercial buildings.

An important early morning event was the

Bringing Natural Gas to DETROIT



pipe line construction

UGI

THE U. G. I. CONTRACTING COMPANY

Division of

UNITED ENGINEERS & CONSTRUCTORS INC.

MAXIMUM RETURN TO CLIENTS PER DOLLAR EXPENDED

NEW YORK CHICAGO PHILADELPHIA LOS ANGELES BOSTON

Enjoying convention golf we see—(left)—CHARLES THOMSON, American Meter Co.; FRED DOYLE, manager natural gas division P. G. and E.; JIM REED, Pacific Coast manager, Cooper-Bessemer; and K. C. TOMLINSON, American Meter.—(center)—FRED GILMORE, Republic Steel Corp.; W. G. B. EULER, general supt., P. G. and E.; DON RAY, P. G. and E. public relations manager; and JAY JENKINS, publisher of G A S—(right)—LEW GALBRAITH, division sales manager, P. G. and E.; H. L. FARRAR, president Coast Counties Gas & Electric Co.; GEO. P. EGLESTON, general manager, H. R. Basford Co.; W. M. HENDERSON, superintendent of distribution, L. A. G. and E.

Women's Committee and Home Service breakfast on Thursday. Jointly presiding over the breakfast meeting were Alma Freeburg, of Coast Counties Gas and Electric Co., Women's Committee Chairman, and Victoria Warner, of the Los Angeles Gas and Electric Corp., Home Service Committee Chairman. Three-minute discussions were devoted to the activities of women in the industry. The business of the Women's Committee was concluded on Thursday afternoon with the address of the chairman and the reports of the Standing and Company Committee chairmen. At this meeting Miss Eleanor Ekman, Los Angeles Gas and Electric Corp., and Miss Clyda Weems, San Joaquin Light and Power Co., led roundtable discussions.

At the annual banquet which formally brought to a close the activities of the convention, the Awards Committee composed of R. N. Dreiman, chairman, A. R. Bailey, R. R. Blackburn, J. M. Bourus, Andrew Kerr, Otto Mauthe, F. U. Naylor, F. A. Hough, E. L. Payne, and Frank Talcott announced the distribution of honors.

It was the decision of the committee that the following receive Gold Medal awards:

James F. Pollard, President Seattle Gas Co., for originating and obtaining "National Advertising at Last".

B. W. Reynolds, Manager Dealer Sales Promotion, Pacific Gas and Electric Co., for his paper "Guiding the Sales Program."

The following were awarded Honorable Mention:

C. E. White, and C. W. Stewart, San Diego Consolidated Gas and Electric Co., for the paper "The Resistance of Pilot Lights to Air Currents".

M. T. Burton, Southern California Gas Co., for "Calorimetric Determination of Hydrogen Sulphide".

Dr. D. R. Drury, University of Southern California, Professor of Physiology, for "Physiological Effects of Natural Gas".

J. E. Currens and C. P. Perkins, Pacific Gas and Electric Co., for "Equipment and Methods of Gas Service Training".

Natural Gas Calorimetry Committee, Guy Corfield, chairman, Los Angeles Gas and Electric Corp.

M. A. Seeley, Los Angeles Gas and Electric Corp., "Standarization of General Service Forms".

C. T. Burns, Southern California Gas Co., "Long Term Appliance Contracts".

Frank Talcott, Pacific Gas and Electric Co., "A Method for Measuring the Effectiveness of Sales Supervisors".

J. E. Kern, Southern California Gas Co., "Group Appliance Selling".

C. C. McRae, Pacific Gas and Electric Co., "Engineering Data for Use in Sales Work".

Beatrice Strege, Home Service Director Seattle Gas Co., "Luncheon Programs to Promote Sales".

Advertising Committee, Forrest Raymond, chairman, San Diego Consolidated Gas and Electric Co.

W. G. Vincent, Jr., Pacific Gas and Electric Co., "Gas Rate Economics".

The Basford Trophy presented annually to the Section having the most successful year was presented to the Technical Section, P. E. Beckman of the Pacific Gas and Electric Co., chairman.

In addition to these awards, the Addison B. Day medal of honor was awarded by the Association's Board of Directors to John H. Grayson in recognition of his many inventions in the gas appliance field.

The Women's Year Book Contest was won by the Pacific Gas and Electric Co., whose committee chairwoman was Zita O'Connor. San Diego Consolidated Gas and Electric Co. with Mary Hurley, chairman, was second. Prizes were $25.00 and $15.00 respectively. Judges were H. M. Ramsey, president of the Welsbach Co., Col. W. F. Rockwell, president of the Pittsburgh Equitable Meter Co., and E. H. Coe, president of the Arizona Light and Power Co.

With the Convention formally brought to a close on Thursday evening the delegates turned to play and sight-seeing. Primary event of Friday morning was the annual golf tournament held at the Lakeside Country Club. Results of the tournament were as follows:

Low net: A. B. Allyne, So. Counties Gas Co., winner of the Babcock-Basford-Pedersen Trophy.

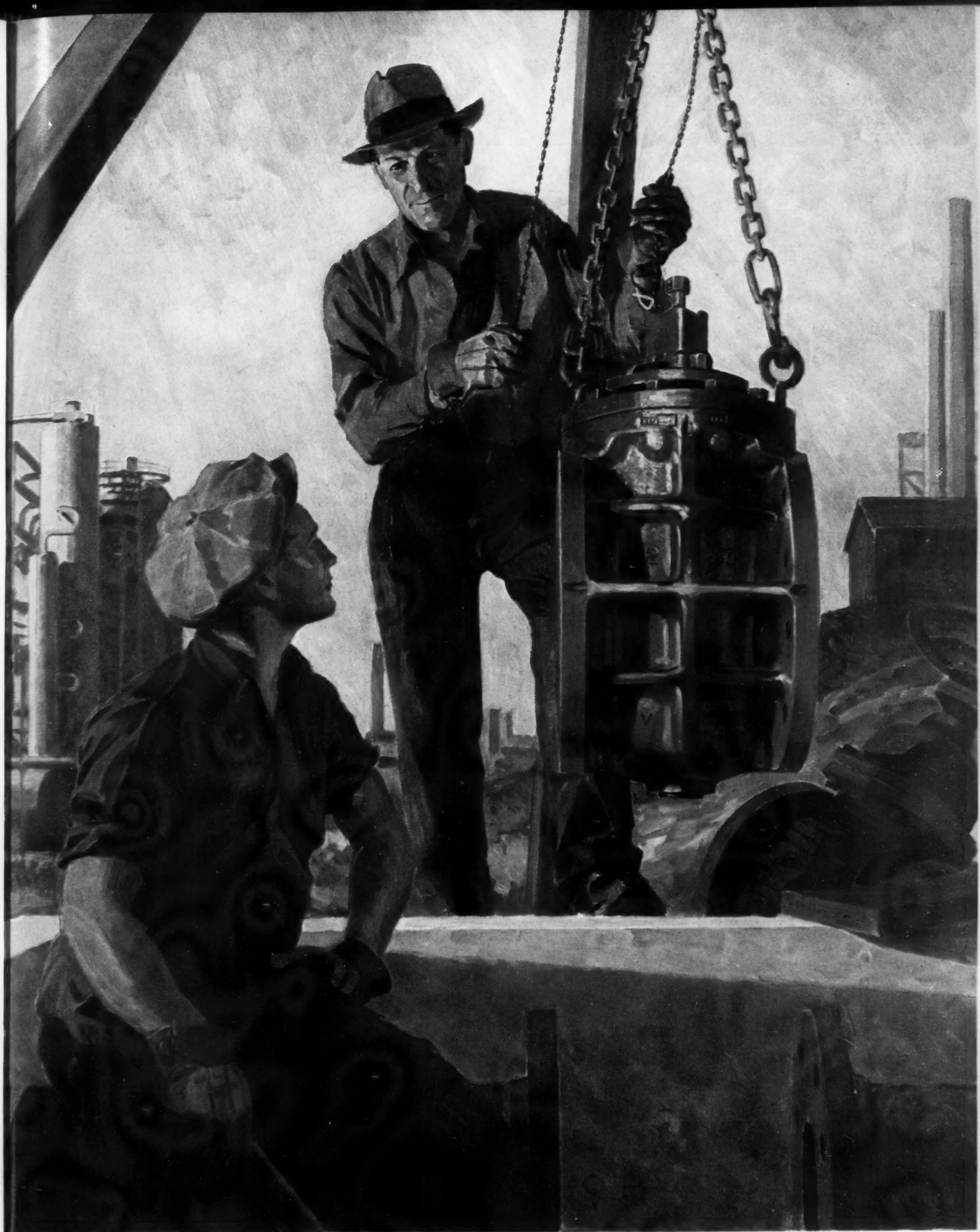
Low gross: W. H. Mixter, H. R. Basford Co.

Class A, handicap 1 to 19: First prize: E. J. Hinchey, Jas. Graham Mfg. Co; second prize: Frank Mosher, Bryant Heater Co.

Class B, handicap 20 to 25: First prize: H. M. Ramsey, Welsbach Co.; second prize: A. B. Allyne, So. Counties Gas Co.

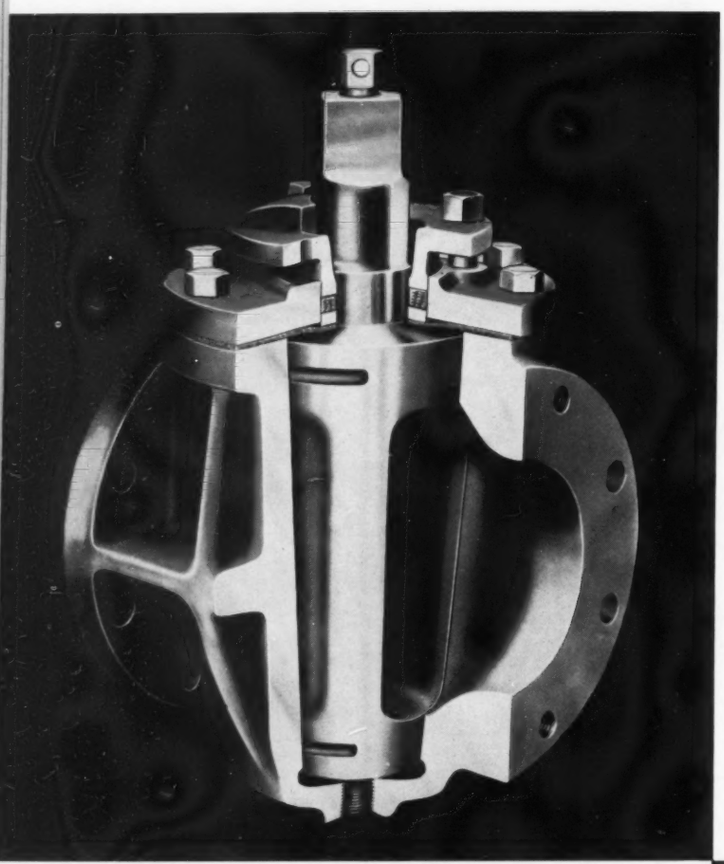
Class C, handicap 26 and up: First prize: J. S. Edwards, So. Calif. Gas Co.; second

BAY, BOATS, and BRIDGES: Out on the rolling waters of San Francisco harbor went a two-boatload crowd of bridge-inspecting conventioneers—(center)—M. A. HARDIE, measurement engineer for Montana Power Co., caught leaning against the rail—(right)—Homeward bound, the boats followed the course of the Bay Bridge.



"Gosh! I wish they'd buy more of these Emco-Nordstroms"

THE PERFECT APPLICATION OF A PRINCIPLE



Above photo shows cut-away section of Emco-Nordstrom. View below shows standard Nordstrom Valves, 12", 14" and 16" sizes, on gas lines in a scrubbing plant.

EMCO-NORDSTROMS are fast replacing ordinary valves on low and high-pressure gas lines.

With the development of Emco-Nordstrom Valves in practically all sizes you can now make replacements without altering the dimensions of the original pipe setting or flanges. Emco-Nordstroms have the same face-to-face dimensions as gate valves. Simply unbolt and remove the obsolete valve and set in an Emco-Nordstrom.

ONLY NORDSTROMS MEET EVERY MAJOR VALVE NEED

FOREVER EASY TO TURN THESE LUBRICATED VALVES

Valves in gas lines sometimes are not turned for a period of many months. But when an emergency arises and you want quick action, how embarrassing if the valve is tightly stuck and can't be "budged." Any Nordstrom Valve will turn easily even if it is not operated for years. Should the plug stick, give the lubricant screw a few turns and the plug will easily turn. And more important, any Nordstrom Valve will keep a tight seal, cutting unaccounted-for gas losses to the irreducible minimum and assuring greater safety.

MERCO NORDSTROM VALVE CO.
a subsidiary of
PITTSBURGH EQUITABLE METER CO.

Main Offices: Pittsburgh, Penna. Branch Offices: New York City, Buffalo, Philadelphia, Columbia, Memphis, Atlanta, Chicago, Kansas City, Tulsa, Houston, Los Angeles and Oakland.

NORDSTROM VALVES

LUBRICATED PLUG

"SEALDPORT" LUBRICATION

PATENTED

prize: F. F. Doyle, Pacific Gas and Electric Co.

Blind Bogey: First prize: Earl Jorgensen, Central Arizona Light and Power Co.; second prize: J. J. Delaney, Reliance Regulator Corp.; third prize: H. M. Evans, So. Calif. Gas Co.

At 2 p.m. on Friday two boat-loads of conventioneers gathered at Pier 14 to embark for a 30-mile swing around San Francisco harbor. The boats were equipped with loud speaker apparatus, and as the voyagers viewed at close range the gigantic bridge structures, a running interview and lecture enabled them to grasp quite completely the magnitude of these two engineering feats.

Delegates to the convention were able to keep pace with the fast-moving events principally through "The Gas Attack," the convention's jesting newspaper which daily presented high lights on personalities, the official convention program, to say nothing of keeping everybody up to the minute on the latest "knock-knocks". Headed by A. C. Joy, P. G. and E. advertising manager, the staff included Frosty Raymond, James Ferguson, R. H. Weisbrod, Agnes M. Barrell, and Marie Wilson.

In closing this account of P. C. G. A.'s 43rd annual convention it is fitting and proper that the Convention Committee under the able chairmanship of Henry Bostwick should receive the final round of applause. Members of the convention committee included: C. B. Babcock, in charge of entertainment; Frank Talcott, reception and attendance; E. J. Hinchey, golf tournament; E. C. Wood, transportation; Jean Frickelton, publicity; Wayne Clark, registration; F. J. Southerland, properties; W. A. Worthington, hotel accommodations; A. C. Joy, Convention newspaper; B. W. Reynolds, banquet. Mrs. H. W. Crawford was the gracious hostess for the convention.

Physiological Effects of Natural Gas

(Continued from Page 37)

taken for chemical analyses of sugar and lactic acid. These tests give us, particularly, knowledge concerning the action of the liver. The results were as follows:

BLOOD LACTIC ACIDS

Subject	Before	1 Hour Exposure
A	28.1	27.0
B	13.3	10.8
C	21.2	11.5
D	12.0	11.2

BLOOD SUGARS

Subject	Before	1 Hour Exposure
A	99	89
B	85	84
C	108	94
D	105	89

These figures indicate that the gas has no action on the physiology of the liver.

Fig. 3 shows an interior view of the test room, while a close-up of the control apparatus used in connection with the test room is seen in Fig. 4. Fig. 5 shows the electro-cardiographic apparatus.

Conclusions

We see from these results that natural gas, even in concentrations of 25 per cent and 30 per cent, have no demonstrable effect on the physiology of the body. It is only of academic interest to study higher concentrations. We have studied the effects of concentrations of 60 per cent and 80 per cent. Here we must make up the mixtures with oxygen, not air. These very high concentrations have some anesthetic action. The animals lose control of their movements to some extent—they become sluggish and their senses become somewhat inactive. They are in a state resembling drunkenness. On putting them back into air again they recover quickly without any after-effects.

With the exception of this slight anesthetic effect of very high concentrations we may say that natural gas is without demonstrable physiological action and this, with the negative pathologist's findings, would certainly warrant the conclusion that this natural gas has no poisonous action on the human system.

Editor's Note: Readers will be interested to refer to a preliminary investigation of natural gas toxicity, made by the Los Angeles Gas and Electric Corp., Southern California Gas Co. and Southern Counties Gas Co., and reported to the Pacific Coast Gas Association by Guy Corfield, research engineer for the L. A. G. and E. Mr. Corfield's report appeared in the March 1935 issue of this publication. Representing the three companies, Mr. Corfield actively cooperated with Dr. Drury in the conduct of the recent study, reported above.

Iowa-Nebraska Light and Power Closes Successful Water Heater Drive

By R. M. OLIVER

Director, Advertising Bureau, Iowa-Nebraska Light & Power Company

WHAT is the toughest competitor of Automatic Hot Water Service?

Sales executives of the Iowa-Nebraska Light and Power Co., which has general offices in Lincoln, Nebraska, faced the issue squarely and found themselves looking directly into the eyes of a lifelong friend of the gas industry—Mr. Tank Heater.

But from the standpoint of the gas company Mr. Tank Heater presented a somewhat different visage than he did some years ago. He was the personification of old-fashioned ways of doing things. His ability to perform a worthwhile and needed service in the home had diminished. In short, he was all right in his day but times had changed and Mr. Tank Heater would have to give way to his younger, more modern rival—Automatic Hot Water Service.

With the issue so definitely determined there was only one thing to do and Stanley Taber, assistant general manager of the company in charge of sales, did it. He said, "Tell the people to take out those old tank heaters. Tell them the truth. Tell them that the only way they can enjoy satisfactory hot water service as it is known in the modern home today is with an automatic gas water heater."

And so the Iowa-Nebraska Light and Power Co. proceeded to do just that. An aggressive campaign was launched featuring the slogan—"TAKE OUT YOUR OLD TANK HEATER—IT WAS ALRIGHT IN ITS DAY BUT TIMES HAVE CHANGED."

The company established a $5 trade-in allowance to offer customers an inducement to get rid of their tank heaters. Terms of 4c a day were offered on the installation of an automatic. A free trial period of 60 days was given to each customer so that the entire family could become thoroughly familiar with automatic hot water service. No down payment was asked.

In an extensive newspaper campaign throughout the company's entire gas properties situated in Lincoln and surrounding smaller towns, ads appeared almost daily in Lincoln papers and weekly in the newspapers of the smaller towns.

Every tank heater user throughout the area served received 5 pieces of direct mail advertising, each portraying the advantages of automatic hot water service and each urging that the tank heater be removed and the special free trial offer be accepted. Mailing pieces prepared by the manufacturer of the water heaters were used but were especially imprinted with "offer" copy. Mailings were spaced approximately two weeks apart and lists were carefully checked after each mailing to remove names of those who had responded and also to add additional prospects.

Two half showings of 24 sheet posters, spaced thirty days apart, shouted the message in a graphic manner to pedestrians and motorists. An electric sign located in Lincoln's densest traffic area informed approximately 40,000 daily that a water heater sale was in progress and urged people to buy automatic water heaters on the 4c a day plan.

Spectacular broadsides in full color were distributed house to house in every town. These broadsides detailed uses of hot water in the home and plugged the offer in bargain sale vernacular. Distributions were made at 20 day intervals.

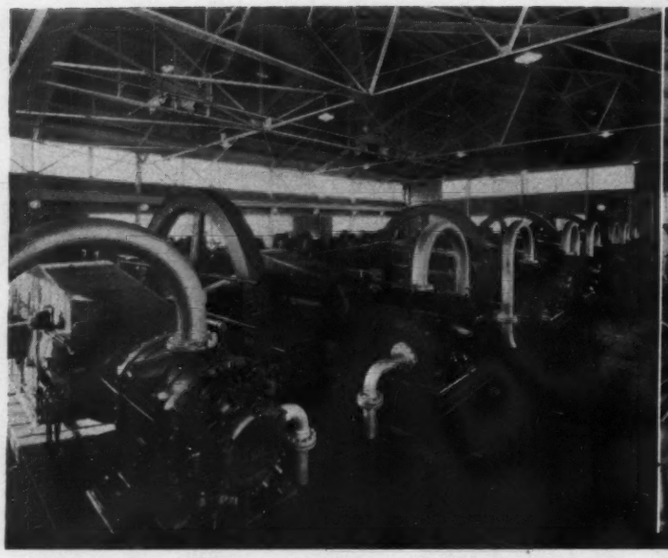
Radio spot announcements also told about the offer and were used during the news period of a popular station in this territory.

Although it is too soon to tabulate results, sales are already definitely ahead of the preceding year.

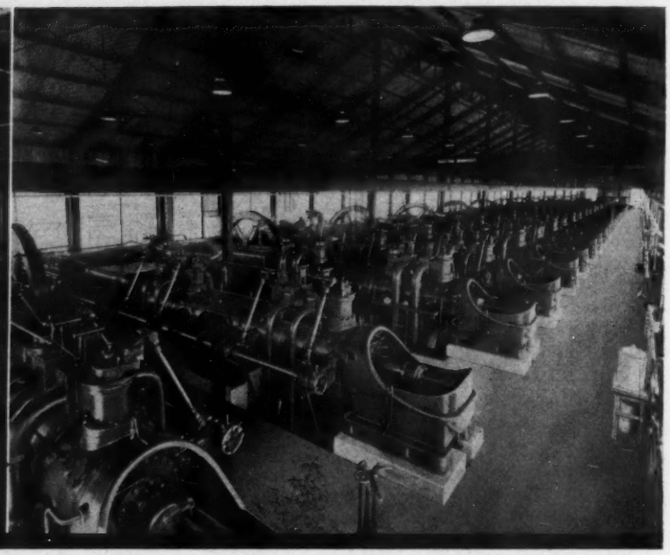
The company's organization is enthusiastic over the results of the idea and the program put on to back it up; local sales managers even taking the trouble to write in expressing appreciation about the pulling power of the advertising.

Company officials feel this campaign and the idea around which it is constructed are definite steps in the right direction toward volume sales of automatic gas water heating.

Advertising will continue during late summer and fall months.



LEFT: Interior of existing station at Liberal, Kansas, showing Cooper-Bessemer installation. Two additional Cooper-Bessemer units are being added this year, raising the station total to 7,000 H.P.



RIGHT: Battery of Worthington units in this interior view of Fritch station on the Natural Gas Pipeline Co. of America line, is typical in arrangement to the Worthington installations being made on Panhandle Eastern project.

The quality of the water obtained varies from 12 grains to 25 grains total hardness per gallon.

In the stations west of Missouri where dust conditions are apt to be severe, extra precautions have been taken to combat dust. These stations are provided with lubricating oil purifiers and all engine air intakes are equipped with air cleaners. Several types are being tried out in an effort to determine the most satisfactory and efficient type.

In order to insure continuity of service and no loss of line capacity because of the formation of gas hydrates or the accumulation of gasoline or water in the line, a gasoline absorption plant and gas dehydration plant is being constructed at Liberal, Kansas, on the outlet side of the Liberal Compressor Station. The absorption plant has been designed to produce any desired grade of gasoline from 26-70 down to a completely debutanized product. It is estimated the plant now being installed will produce approximately 40,000 gallons of 26-70 gasoline under peak load conditions. Absorbent oil circulation rate will be 270 gallons per minute. The plant as now designed will handle 135-150 million feet of gas per 24 hours. All piping, stills, stabilizers and pumps are of sufficient capacity to take care of a 200 million foot plant. The only additions required in the event of such a load are additional absorber capacity, heat exchangers, recompressors and cooling tower structures. The plant is laid out so that these additions can be made with a minimum of change or disturbance.

The dehydration plant will be of the calcium chloride brine circulating type,

COMPRESSOR STATIONS

(Continued from Page 22)

using butane as a refrigerant to cool the concentrated brine. Brine circulation will be at the rate of 450 gallons per minute. The majority of the pumps in both the gasoline and dehydration plant will be Dean Hill direct connected to Louis Allis explosion proof motors. A few

Basement for main building at Haven, Kansas station. Note height of building wall and engine foundations above basement work.

Union Steam pumps are used on reflux, boiler feed, and stabilizer feed services. Recompressors and refrigerant compressor are Cooper-Bessemer Type 80 gas engines. Two Erie City 250 H.P. boilers producing steam at 200 pounds pressure are being installed. Oil coolers, vapor and gasoline condensers and exchangers are all Griscom Russell of various types.

Cooling tower will be of the double effect, induced down draft type, provided with two separate basins and two separate water circulating systems, one for each end of the tower. The hot ends of all cooling and circulating systems will be placed in one end of the tower behind a transverse curtain wall and the cold ends in the opposite end of the tower on the other side of the wall. By this arrangement, the major part of the heat is removed from the material being cooled at relatively high temperature gradient in the hot end of the tower, leaving the cold end of tower a relatively low heat load at low temperature gradient, thus accomplishing an exceptionally close approach to wet bulb temperatures. The tower will be 156 feet long. Water requirements for the tower are calculated at 3,200 G.P.M.

A quarter of a million gallons of gasoline storage is provided. Gasoline shipments will be made from a 10-spill rack located about three-quarters of a mile from the plant on the Rock Island Railroad.

All power and light for the plant will be generated on the site and two Ingersoll-Rand P.V.G. 360-H.P. eight cylinder gas engines, direct connected to

(Continued on Page 67)

Congratulations

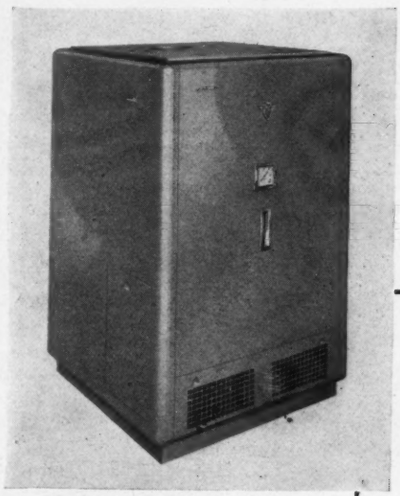
DETROIT!

In a tremendous job well undertaken. We are indeed proud that we have a part in your great work of spreading the benefits of **REALLY AUTOMATIC...**

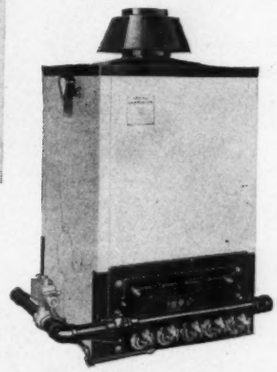
Gas-Fired

HEAT *and* HOT WATER

at low cost

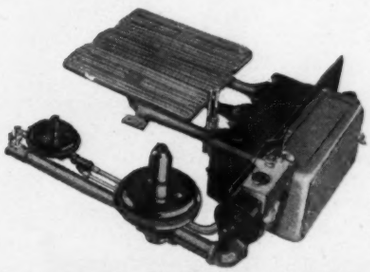


"EMPIRE" IDEAL—The world's most beautiful gas boiler. Completely automatic with the thermotor Valve. No exposed piping; even flue and header come out at the back in some models. Every size and type.



IDEAL GAS-FIRED BOILER—STANDARD TYPE—From the smallest to the world's largest, provides a size and type for every domestic and industrial need.

AMERICAN GAS CONVERTER (above)—combines features never before incorporated as standard equipment in a burner. For all types Round Boilers and furnaces. Also tailor made for Arco Round Boilers.



REDFLASH GAS CONVERTER (left)—Tailor made for No. 1 series Arco Redflash and similar boilers. Complete with special baffle equipment.

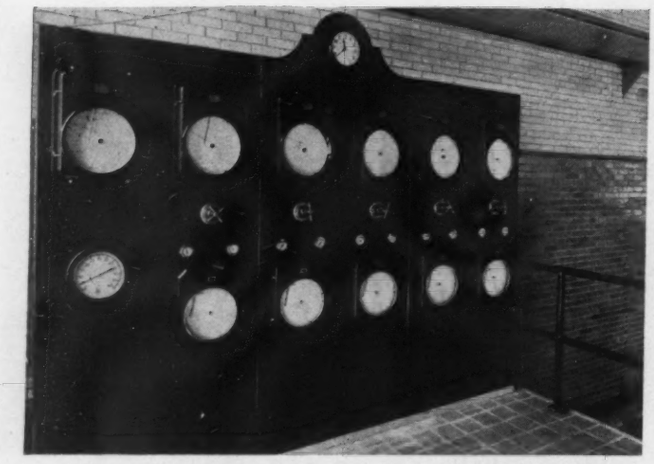
AGP HOT WATER WITH GAS

AGP Automatic Gas-fired **STORAGE WATER HEATERS** — 3 types . . . sizes from 15 to 75 gallons. Tanks of galvanized steel or new rustproof ARCOLOY (strengthened copper).

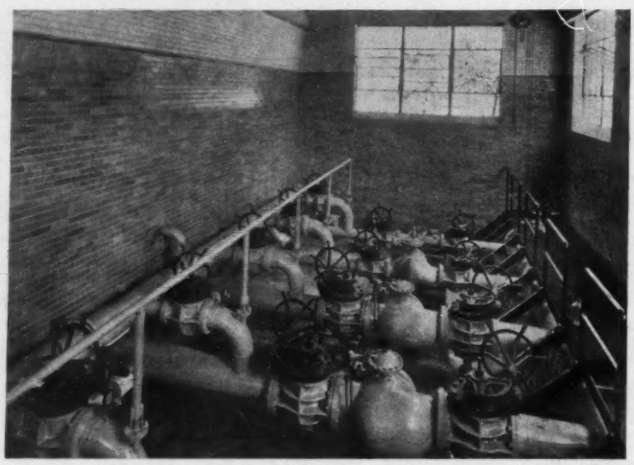
AMERICAN GAS PRODUCTS CORPORATION

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

40 WEST 40TH STREET · NEW YORK, N.Y.



PANEL BOARD showing equipment manufactured by Bristol Co. for controlling and recording pressures and humidification at Detroit City Gas Co.'s River Rouge regulator station.



THESE 12 - INCH Emco regulators step down a 100-pound inlet pressure to various distribution pressures. Shown also are Merco - Nordstrom valves on regulator runs and by-pass connections.

Detroit Change-Over

(Continued from Page 26)

Engineers of industrial plants visit the laboratory in relays in order to observe and study the performance of equipment on natural gas.

Each industrial plant is notified as to the exact time of its change-over, and engineers from the Industrial Department attend the change-over, remaining in the plant until it is operating efficiently on the new gas.

With some plants involving the operation of as many as 75,000 men and embracing as high as 324 gas-burning units, the very great responsibility of seeing that not a single mis-step in a given operation is made, has been keenly felt by executives of the gas company.

One- and two-family residences predominate in Detroit, there being 209,981 one-family dwellings, 40,726 two-family dwellings and 12,662 three or more-family dwellings. These house a total of 370,293 families. There are approximately 8,350 apartment houses and apartment hotels in the city.

Increasing the house heating load is regarded as of prime importance by the gas company and special promotional material has been designed and 100 newly employed salesmen, specially trained in a week's course of instruction, are being sent out in the interest of this business. At the moment the efforts of these salesmen are chiefly directed toward prospects having house heating installations of competing types of fuel.

Every encouragement is also being lent to employees to purchase house heating equipment through specially priced equipment marked down for a limited period.

Change-over men are filing complete information on all appliances in the homes that they enter, giving as well the condition of the appliances. While no suggestion is made to the consumer about the age or condition of the appliance at the time that the information is secured, the facts will be available for the sales activities of future years.

The promotional rate effective is:

First 2 Detroit Gas Units*	75c per unit
All over 2 Detroit Gas Units	55c per unit
For House Heating	32c per unit

The house heating rate is available to customers who use no other kind of fuel than gas for heating their premises.

The policy of the gas company is to work with all manufacturers of A.G.A. approved appliances who are seeking business in the city. Many types of A.G.A. approved appliances are exhibited from the gas company sales floor.

While the manufacturers of gas company choice are given the majority of the business sold by company salespeople, the rights of other manufacturers are definitely observed. If a heating job originates with the gas company its engineers select the equipment according to pre-arranged allotment of business by percentages to major firms.

Several of the leading manufacturers of equipment and controls have conducted training courses for employees around their particular equipment. These courses have been welcomed by the management and have been well attended by the sales force.

Special maps have been designed for the change-over. A book of these maps, one for each of the 27 districts, is in service in the office of the engineer of the company. Progress in the change-over is posted on a large wall map (10 by 17 ft.) of the distribution system located in the headquarters office of the operating division of the company.

This map shows the transmission line entering the city from the Southwest and the 27 districts into which the city has been divided, and spots-in the stationary equipment such as gas holders, pumping stations and similar equipment in the divisions. Various symbols and colors are used to show the progress at the moment from the preliminary adjustment stage until the district has been completely changed over to natural gas.

As the natural gas reaches the River Rouge plant of Detroit City Gas Co., it is metered by a newly constructed station erected by the pipe line interests on the property of the gas company.

Passing this station the gas enters the regulator station of the gas company, also just erected. Here it is stepped down from 100 lbs. pressure to adequate pressures for distribution purposes.

This new regulator station, the only major piece of new construction required by Detroit City Gas Co. in making the change-over, has a separate room for odorizing equipment. Fire walls separate the regulator room from the oil fogging equipment. Steam boilers providing steam for humidifying are located in the same department with the oil foggers. Other rooms are given over to recording calorimeters and to general laboratory work.

Gas introduced into the distribution system is conveyed to the northern section of the city. Two main lines go east through the northern portion of the city. Two main lines also take-off at the southern end extending east through the southern portion of the city.

These main lines converge at the eastern extremity with numerous lines taking off in a southerly and northerly direction from the respective main lines, to form interconnections throughout the city.

The system now embraces 10 pumping stations and four manufactured-gas plants, with gas having been formerly purchased at three other plants. Two coal gas plants that have been standing by are being dismantled, and the four water gas plants have been equipped for the manufacture of high B.t.u. gas under special plans developed by engineers of the gas company.

*A Detroit Gas Unit is equivalent to 530,000 B.t.u.

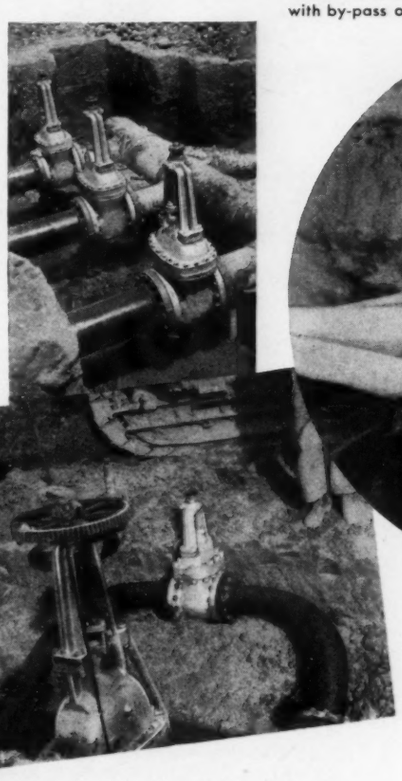
Crane VALVES, FITTINGS *and* HEADERS ON MICHIGAN GAS *Transmission* LINE

● Crane valves, fittings and headers were used on the newly completed Michigan Gas Transmission Line.

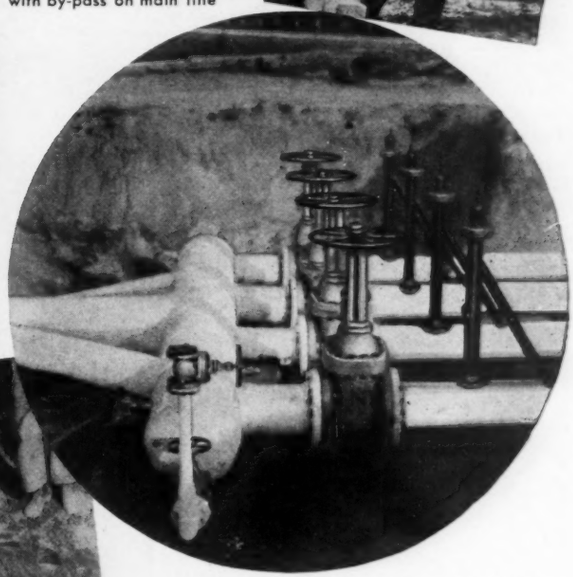
The selection of Crane products for this important natural-gas line was a natural one. For years Crane valves, fittings and fabricated piping have demonstrated their maintained tightness, minimum maintenance and unfailing dependability in exacting natural-gas-field, booster-station and pipe-line service.

Of the ten important pipe lines completed within recent years, eight are exclusively Crane equipped — convincing proof of the trustworthiness of Crane products.

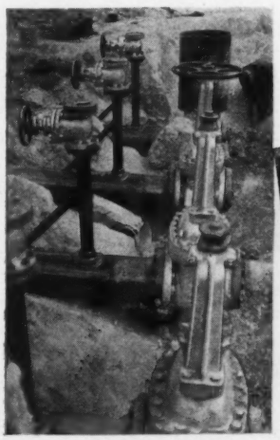
22-inch Crane Gate Valve with by-pass on main line



Crane Welded Header and Gate Valves at Wabash River



Crane Welded Header and Gate Valves at Raisin River



Crane Blow-Off Valves at Wabash River

Lowering 22-inch Crane Main-Line Gate Valve Assembly

CRANE

CRANE CO., GENERAL OFFICES: 836 SO. MICHIGAN AVE., CHICAGO, ILL. • NEW YORK: 23 W. 44TH STREET

Branches and Sales Offices in One Hundred and Sixty Cities

VALVES, FITTINGS, FABRICATED PIPE, PUMPS, HEATING AND PLUMBING MATERIAL

The high B.t.u. plants, which can be brought into service at any time the 90 million cu. ft. of gas available daily under the pipeline contract is not sufficient, or when service has been interrupted, have already proved satisfactory under test demonstrations. These production plants have a daily capacity of 70 million cu. ft. of high B.t.u. gas.

A 50 million cu. ft. maximum day requirement is expected by officials of the company the first year, with this increasing to 120 million cu. ft. the fifth year.

Officials of the Detroit City Gas Co. are: William G. Woolfolk, president; C. W. Bennett, vice-president and general manager; J. W. Batten, vice-president and assistant general manager; C. S. Ritter, secretary and treasurer; Adam Kurtz, controller; A. I. Snyder, engineer; Henry Fink, engineer in charge of manufacture; A. H. Anderson, superintendent of distribution; Newell E. Loomis, sales manager; Roger Karcher, assistant sales manager; Theodore W. Weigel, engineer for sales department; William G. Boley, purchasing agent.

■ ■

Albert G. Wishon, California Utility Pioneer, Dies

ALBERT GRAVES WISHON, past president and founder of the San Joaquin Light and Power Corp. died June 17 at the age of 77. When the San Joaquin Light and Power Corp, merged in 1930 with the Pacific Gas and Electric Co., Mr. Wishon retired from its presidency, became vice-chairman of the board of directors and a director, positions which he held until his death. His son, A. Emory Wishon, succeeded him as president of the San Joaquin Corp.

Mr. Wishon was born in Phelps County, Missouri in 1858. After working for a time in a general merchandising store in St. Louis, he moved to St. James, Mo., and opened up his own store. Soon after his marriage with Miss Henrietta Emory of St. James, Mr. Wishon sold his store, moved to the Pacific Coast. In 1898 he promoted and built the Mt. Whitney Power Co., now a part of the Southern California Edison system. In 1903 Mr. Wishon moved to Fresno, found the San Joaquin Electric Co. in hands of a receiver. With San Francisco and Los Angeles capital, he took over the bankrupt company, and began the development of the present San Joaquin Light and Power Corp.

NATURAL GAS CUTS POWER COSTS 75%

MONTHLY OPERATING COST OF $240 REDUCED TO $60
By Installation of

Internal Combustion Engines Converted to the Use of Natural Gas by Barton Brown Gas-Air Mixers

1000 Installations Operating in Los Angeles District

Maximum Dependability
Minimum Servicing

ADAPTED TO ALL GASES

We Invite You to Write Us For Further Information

◆

BARTON BROWN ENGINEERING CORPORATION
1109 Santa Fe Ave.
Los Angeles

■ ■

Portland Gas Co. Builds Mains To Serve New Customers

To extend service to new customers Portland Gas & Coke Co., Portland, Ore., during the first six months of 1936 constructed approximately 10,000 feet of new gas mains, according to a report by D. B. Larson, superintendent of the company's distribution bureau. Much of the construction was done in the Willamette Valley, first served by the company in 1929 and 1930, and sales in this area showed a 36 per cent increase over the first six months of 1935. Largest single job was a 1000-foot extension in Corvallis. During the six-months period a 15 per cent increase in new gas connections was attributed to renewed building activity.

■ ■

A. G. A. Industrial Committee Issues Sales Letters

Issued last month by the A.G.A. Industrial Gas Section's Committee on Sales Training and Marketing Analysis was "Salesmen's Letter No. 1," on "Selling Industrial Gas." In "Letter No. 1" the committee deals in general with the three primary selling difficulties (those that require further application of sales fundamentals, those that require further engineering treatment, those that require self analysis and discipline), and plans to devote future letters to more complete discussions of each of these sales obstacles. Further plans call for letters dealing with particular problems and questions suggested by individuals.

■ ■

Brooklyn Co. Sets High Mark In Dealer Appliance Sales

YEAR-END figures of the Brooklyn Union Gas Co., Brooklyn, N. Y. reveal that more than three-quarters of a million dollars worth of appliances was sold by the company's cooperating dealers during the seventh year of the dealer-cooperative movement For the 12-month period ending June 30, sales totaled $769,900.46.

June's dealer business totaled $107,168.06. Of this $90,371.41 was dealers' sales and $16,796.65 sales from dealers' leads. Refrigerators led all other appliances in amount sold, totaling $56,645.10. House heaters were second with $13,698.67.

Municipally-Owned Utilities Fight Indiana Taxation

UTILITY Companies the country over are awaiting with interest the final outcome of litigation in Indiana courts involving a 1933 statute which requires municipally-owned utilities to pay county and state tax levies. Taxes for 1934 payable in 1935 were the first collected under the statute, and several of the municipal plant operators paid under protest, later filing suit to test the constitutionality of the act.

The first such suit was won by the municipal plant operators, and several others are being held in abeyance until the state's higher courts rule on the appeal taken against the first decision by the state's attorney-general.

This tax law, which attracted considerable attention at the time it was enacted, was the outgrowth of a program by the Indiana Farm Bureau Federation to lighten the tax burden on farms. The Bureau's tax experts saw that private utilities operating in the same city that owned a municipal utility paid all the levies—city, school, township, county and state. It was their hope to have municipal plants required to do the same thing, but the municipally-owned utilities fought the proposal.

As a compromise, it was agreed the municipal plants should pay county and state levies, leaving them immune from the purely local levies. Since the law was enacted, the municipal plants have fought bitterly to have it repealed, first in the 1935 regular legislative session, and again in the special session of 1936. Meantime, however, considerable sentiment has developed to require them to pay not merely the county and state levies, but all the property tax levies.

The present situation is interesting to Hoosier students of the legal aspect of taxation. In 1933, legislative committees asked the attorney-general's office for an opinion as to the constitutionality of the act, and were informed the measure was sound. Now his office is seeking to convince the courts its opinion was correct.

■ ■

Summer Budget Plan Adopted By Portland Gas Co.

TO SAVE its customers the burden of heavy winter gas bills, the Portland Gas & Coke Co., Portland, Ore. is offering gas users a new summer budget plan in which deposits are made during the five summer months from June through October to be credited against the heavier winter bills from November through April. The plan not only evens up the distribution of the family budget throughout the year, but also enables the budget plan buyer to save 6 per cent on his summer deposits.

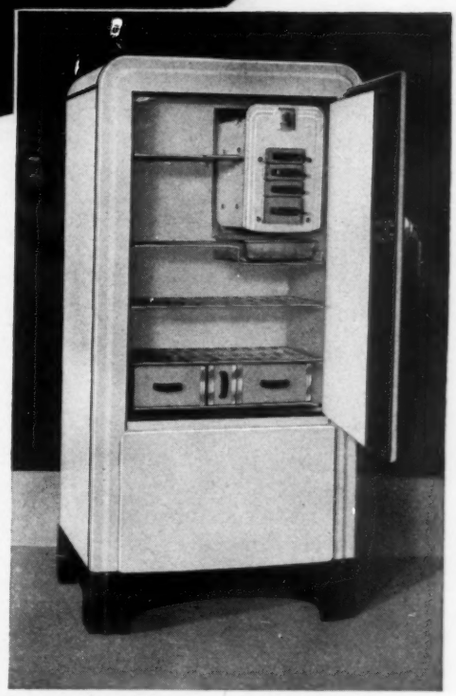
Most practical method of using the plan, according to B. H. Parkinson, commercial manager of the company, is for the customer to buy a summer budget that is not less than one-third nor more than one-half of the total heating bill. Summer budgets with a credit value of 15, 30, 45, and 60 dollars are for sale at 14, 28, 42, and 56 dollars. Unused credit in any month is not applied to the succeeding month, but is carried to the end of the heating season, when a rebate less 6 per cent is made to the customer.

AS SOUTHERN CALIFORNIA GOES

so goes the trend of the nation!

ELECTROLUX

CONTINUES TO OUTSELL ANY OTHER REFRIGERATOR IN SOUTHERN CALIFORNIA



The companies which made this record are

SOUTHERN CALIFORNIA GAS CO. SOUTHERN COUNTIES GAS CO.

LOS ANGELES GAS AND ELECTRIC CORPORATION

AGAIN THIS YEAR, gas refrigeration has won an outstanding vote of approval in Southern California! This continued success is significant of what intelligent and aggressive sales promotion can do. And it's significant, too, of the ever-growing preference for this modern gas appliance in all parts of the country.

In the face of the strongest kind of competition, gas companies everywhere are *Marching to Leadership with Gas Refrigeration!* The past six months have seen the record-breaking sales and merchandising achievements of 1935 *topped* by even greater achievements. In section after section, there has developed a definite trend to Electrolux, the gas refrigerator... and this trend is fast becoming nation wide.

More sales this summer

The hot summer months offer a psychological time to *press* this victory for gas refrigeration. Months when families realize more than ever their need for efficient food protection . . . desire the convenience of ice cubes always on hand. Months when your salesmen can bring home to these families, opportunely, the big unmatched advantages of Electrolux's different, simpler operating method.

Servel, Inc., Electrolux Refrigerator Sales Div., Evansville, Ind.

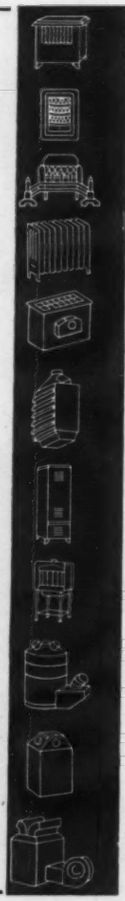
New Air-Cooled **ELECTROLUX**
THE SERVEL *Gas Refrigerator*

The
PACIFIC
Name
on any Gas Heating Appliance guarantees its
SAFETY
RELIABILITY
***and* ECONOMY**

Have you seen the New Pacific Floor, Dual and Single Wall Register Furnaces?

There is also a Pacific Gas Heating Appliance for every need—Circulators, Radiant Heaters, Gravity and Blower Furnaces, Forced Air Units, Ventilating and Air Conditioning Equipment. Write for Catalog G9.

PACIFIC GAS RADIATOR CO.
Huntington Park, Calif.



HERE'S a saying that I ran across in some of my father's old papers. Maybe it will strike you as it did me.

"When the one great Scorer comes to write against your name, he writes not that you won or lost, but how you played the game".

It's a good maxim of any business. We apply the principle to heating and are still doing our best to build good heating and air conditioning equipment.

H. P. MUELLER,
President.

L. J. Mueller Furnace Co.
Milwaukee

MUELLER-MILWAUKEE

O'Brien, Byllesby President, Taken by Death

JOHN J. O'BRIEN, president of H. M. Byllesby and Co. and Standard Gas and Electric Co., died Aug. 7 of a heart attack following a two weeks' illness.

Mr. O'Brien was born in Chicago April 2, 1869. He was educated in public and parochial schools and business colleges and was employed by the Pullman Company at the age of 18. Two years later, in 1889, he became associated with the Chicago office of the United Edison Manufacturing Co., predecessor of the company which was merged with the General Electric Co. in 1892. He was in charge of accounting for the Chicago office territory of the General Electric Co. when, in 1902, he became associated with the late Colonel H. M. Byllesby in the formation of the Byllesby organization. During the years that followed, Mr. O'Brien served as treasurer and general auditor of the company, and upon the death of Colonel Byllesby in 1924 was elected president of the Byllesby organization.

As a partner in the Byllesby organization, Mr. O'Brien was a pioneer in the promotion of the group method of developing electric and gas properties, through the application of centralized financial, engineering and management services.

■ ■

Jones Appointed To Republic Steel Sales Post

THE appointment of Hoyle Jones as district sales manager with headquarters in Tulsa, Okla., has been announced by N. J. Clark, vice-president in charge of sales of Republic Steel Corp. This appointment fills the vacancy caused by the recent death of C. S. Powers, former district manager.

Mr. Jones began his career in the steel and allied industries in 1904 with the United Zinc and Chemical Co., with offices in his home town of Kansas City, Mo. This company was later acquired by American Zinc Co. and in 1907 he was appointed assistant manager with offices in Chicago. Mr. Jones went to St. Louis in 1908 as manager of the American Zinc Co., where he remained until 1910 when he returned to Kansas City as secretary of Jacques Steel Co. In 1919, he organized and became president of Superior Tube Co., remaining as head of that company until just prior to his appointment as district sales manager of Republic.

■ ■

American Gas Products Appoints Chamberlain

Kenneth Chamberlain, who for the past seventeen years has been connected with the Gas Light Co. of Worcester, Mass., in a sales and engineering capacity, has been appointed sales representative in the Boston territory of the American Gas Products Corp., a division of American Radiator & Standard Sanitary Corp., according to an announcement by H. H. Dugdale, Vice-President in charge of Sales, of the company. In New England he will be associated with Edward B. Bangs, who was placed in charge of the Boston office of American Gas Products Corp. earlier this year.

Gas Given Attention At World Power Conclave

AT the Third World Power Conference to be held in Washington, September 7 to 12, three of the 18 major topics included on the program will deal with the gas industry. These general topics are the "Development and Utilization of Power Resources", the "Transportation of Natural and Manufactured Gas", and "Conservation of Petroleum and Natural Gas." Under these three heads some 35 individual papers have been contributed.

In connection with the third World Power Conference a gas industry exhibit has been placed on display in the new National Museum on Constitutional Avenue, Washington, D. C. The display was assembled under the direction of F. A. Lydecker, chairman of the A.G.A. Technical Section. Mr. Lydecker was assisted by Robert A. Carter, engineer of manufacture, Consolidated Edison Co. of New York and Raymond M. Martin, director of display for the same company.

The 40-foot display situated in the main hall of the Museum is divided into three panels: first, production and transportation of natural gas; second, the utilization of gas in home and industry; and third, the production of manufactured gas.

The Washington Gas Light Co. has arranged in its own building, 411 10th Street, N. W., an exhibit of gas appliances for inspection by foreign and other delegates.

■ ■

American Radiator Adds Control Features

AMERICAN Radiator Co. announces the development of "Balancing" Elbows and "Tight-close" Radiator Valves that permit the same adjustable control over hot water systems that is incorporated in the company's new one- and two-pipe steam systems.

The new "Balancing" Elbows, made in ⅜, ½ and ¾ in. sizes for radiator return connections, make it possible to provide controlled flow of water to each radiator after installation on either gravity or forced circulation jobs. With the adjustable baffle, that can be set after the job is in operation without draining the system, it is possible to choke the flow to radiators closest to the boiler and provide a free flow to radiators as the distance from the boiler increases. This balancing feature is also incorporated in Stright-way Fittings, for use on the return connection of convector radiators.

Both the "Balancing" Elbows and Stright-way Fittings, besides being supplied with standard pipe thread at the bottom, are furnished with sweat connections that eliminate an adaptor on copper pipe jobs.

The "Tight-close" Radiator valves, made in both packless and packed types for ¾ or ½ in. pipe connections, employ the patented "swinging plate" feature, without the circulation hole used on the ordinary hot water valve. This plate, perfectly concentric with the bore of the valve, provides means for keeping the radiators, especially where a circulator is used, from getting too warm.

Better load building for your company
Money saved for customers...

"Lovekin" Automatic Storage Gas Water Heater—New Series 10, with tank of welded Everdur Metal. Made by Lovekin Water Heater Company, Philadelphia, Pa.

36126

ANACONDA
from mine to consumer

When automatic water heaters have tanks of non-rust

EVERDUR METAL
(Strengthened Copper)

Tanks of sturdy, non-rust Everdur Metal will do just that, because . .

From the standpoint of your company—heaters equipped with Everdur Metal tanks provide steadier gas consumption. Rust... and rust-repairs, or replacements... can never interfere with their efficient operation. And...at the same time . . . you are saved many a profitless service call. For these very same reasons—you can offer more attractive, longer-term payment plans.

And your customers get—the convenience of clean, *rust-free* hot water indefinitely. Freedom from the expense of repairs and replacements due to tank rust. Long, dependable, money-saving service which they *cannot* get from tanks made of rustable metal.

Everdur is nearly all copper... scientifically alloyed with silicon and other elements to provide the strength and "weldability" of steel. Because of its ruggedness... and immunity to rust...leading makers of automatic gas water heaters now standardize on tanks of Everdur Metal for rust-proof models.

"EVERDUR" is a registered trade-mark, identifying products of The American Brass Company made from alloys of copper, silicon and other elements.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Connecticut
Offices and Agencies in Principal Cities

EVERDUR METAL FOR TANKS

A COPPER ALLOY WITH THE STRENGTH OF STEEL

YOUR Console Heater SALES Will PROFIT

by the Domestic Room Thermostat

The public is demanding automatic heating. And when a console heater is equipped with a Domestic Room Thermostat to deliver constant automatic heat, it becomes much more saleable merchandise.

The Domestic Room Thermostat is easily installed on the line ahead of the heater. Already many lines of console heaters come factory equipped with the Domestic Room Thermostat. It will pay you to investigate.

Domestic Manufacturing Co.
700 East Florence Ave. Los Angeles, Calif.

BUILD YOUR LOAD WITH

WARD

FLOOR FURNACES

More than 325,000 in use today

ASK FOR CATALOG AND PRICE LIST

WARD HEATER CO., LTD.
1800 West Washington Blvd.
Los Angeles, California

Refrigeration Winners Made Known

VICTORS in the biggest and most successful refrigerator-selling contest ever sponsored by the American Gas Association Refrigeration Committee have been announced by B. H. Gardner, chairman of the Committee. Awards amounting to $27,230 have been granted to the winners who have been declared the "leaders" in the contest. A total of 1,044 awards were granted in all. The leaders consist of gas companies and of individual members of sales forces who were ahead in refrigerator sales. Sixty companies shared in the awards.

The highest honors of the campaign were the eight "Swords of Merit," that will be presented to the eight companies who were at the top in their respective divisions. Sword winners were the Washington Gas Light Co., Washington, D. C.; Gas and Electric Appliance Co., Columbus, Ohio; Detroit City Gas Co., Detroit, Mich.; Cumberland and Allegheny Gas Co., Cumberland, Md.; Manufacturers Light and Heat Co. (Ellwood City District), Bellevue, Pa.; North Penn Gas Co., Port Allegany, Pa.; Lynchburg Gas Co., Lynchburg, Va., and Broad River Power Co., Florence, S. C. These trophies were in addition to the highest awards granted to company winners.

Presentation of the "Swords of Merit" will take place at the annual convention of the American Gas Association to be held this Fall in Atlantic City.

The refrigerator-selling contest just ended is the fourth of its kind to be conducted by the Committee. The first contest, held in 1933 was called the "Ice Cube" contest, the second in 1934 was the "Go-Getter" or "Blue Vase" campaign, the third in 1935, the "Prosperity Cup" contest.

This year's drive, called the "1936 Leadership Refrigeration Campaign," was carried on during April, May and June. The "Sword of Merit" was chosen as a trophy, the sword typifying leadership not only on the part of the competing company, but leadership among sales persons. This is the second year that the Committee offered cash awards to individuals for their sales efforts.

Each campaign has been larger than its predecessor. Nearly 600 companies representing nearly 10,000,000 meters, participated in the "Sword of Merit" campaign.

The 1936 contest was conducted in collaboration with Servel, Inc., manufacturers of Electrolux refrigerators, and the Committee gives high praise to that company for its promotional and advertising activities which were such important factors in making the campaign so successful.

Company winners of awards standing second in the final results were: Kings Appliance Corp., Brooklyn, N. Y.; Providence Gas Co., Providence, R. I.; Milwaukee Gas Light Co., Milwaukee, Wis.; Manufacturers Light and Heat Co., East Liverpool, Ohio; Southern Indiana Gas and Electric Co., Evansville, Ind.; Rosslyn Gas Co., Clarendon, Va.; Virginia Gas Distribution Corp., Staunton, Va., and Arkansas Lousiana Gas Co., Vivian, La.

Companies winning awards through standing third were: Consolidated Edison Co. of New York; New Haven Gas Co., New Haven, Conn.; Minneapolis Gas Light Co., Minneapolis, Minn.; Springfield Gas Light Co., Springfield, Mass.; Birmingham Gas Co., Birmingham, Ala.; Natural Gas Co. of West Virginia, Wheeling, W. Va.; Peoples Gas Co., Port Arthur, Texas; United Gas System, Sinton, Texas, and Manufacturers Light and Heat Co. (Chester District), East Liverpool, Ohio.

Fourth place was gained by the following: Southern California Gas Co., Los Angeles, Calif.; Brooklyn Borough Gas Co., Coney Island, N. Y.; Hartford Gas Co., Hartford, Conn.; Arkansas Louisiana Gas Co., Little Rock, Ark.; Central States Power and Light Corp., Tulsa, Okla.; Manufacturers Light and Heat Co. (Rochester District), Bellevue, Pa.; Tyler Gas Service Co., Tyler, Texas, and Virginia Gas Distribution Corp., Waynesboro, Va.

Companies winning awards through standing fifth were: Brooklyn Union Gas Co., Brooklyn, N. Y.; Public Service Electric and Gas Co., Newark, N. J.; Southern Counties Gas Co., Santa Ana, Calif.; Montana-Dakota Utilities Co., Minneapolis, Minn.; Manufacturers Light and Heat Co. (Beaver Falls District), Bellevue, Pa.; United Gas System, Harrisburg, Texas, and Gas and Electric Appliance Co., Caldwell, Ohio.

Companies that received sixth place awards were: Western United Gas and Electric, Aurora, Ill.; Ohio Fuel Gas Co., Mansfield, Ohio; Manufacturers Light and Heat Co., Bellaire, Ohio; Ohio Fuel Gas Co., Baltimore, Ohio; United Gas System, Childress, Texas, and Central Electric and Telephone Co., Columbus, Nebraska.

Seventh place awards went to the following: Metropolitan Utilities District, Omaha, Nebr.; Bridgeport Gas Light Co., Bridgeport, Conn.; Houston Natural Gas System, Houston, Texas; Manufacturers Light and Heat Co., Washington, Pa.; Keystone Gas Co., Inc. (Olean District), Olean, N. Y., and Piedmont Gas Co., Hickory, S. C.

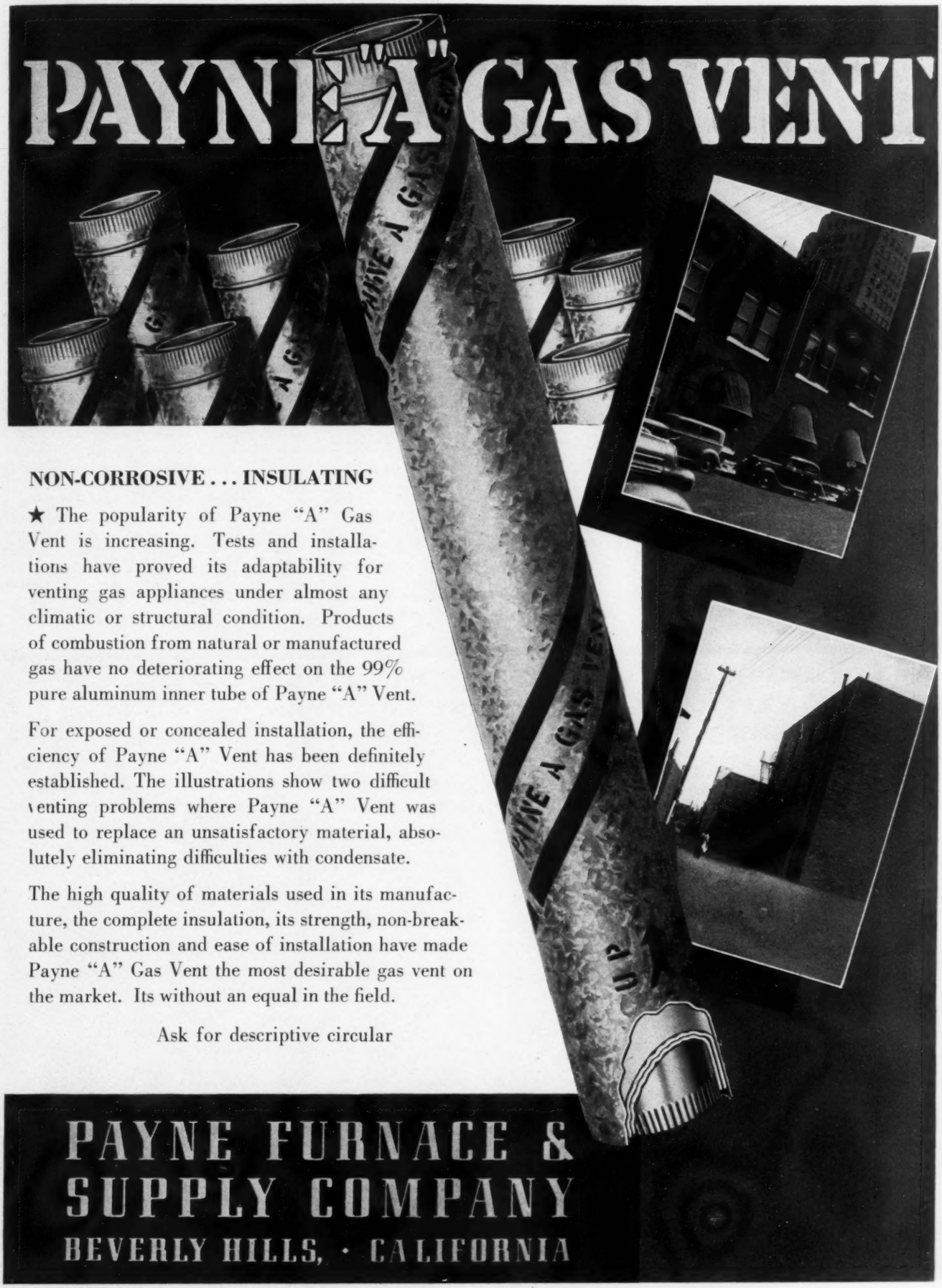
Companies winning awards for standing eighth were: Elizabethtown Consolidated Gas Co., Elizabeth, N. J.; Manufacturers Light and Heat Co., Pittsburgh, Pa.; Natural Gas Co. of West Virginia, Salem, Ohio; Lowell Gas Light Co., Lowell, Mass.; Hornell Gas Light Co., Hornell, N. Y.; Gas and Electric Appliance Co., Cambridge, Ohio, and Gas and Electric Appliance Co., Amherst, Ohio.

Special high cash awards were granted to three companies that made exceptional records in the "installations per 10,000 meters" class. These were the Washington Gas Light Co., Washington, D. C.; Providence Gas Co., Providence, R. I.; and Springfield Gas Light Co., of Springfield, Mass.

In this campaign home service departments were offered awards for the first time. The winners were the home service departments of the Washington Gas Light Co., Gas and Electric Appliance Co., Providence Gas Light Co., Detroit City Gas Co. and the Springfield Gas Light Co.

The individual cash awards went to 983 sales people and they included awards for

PAYNE "A" GAS VENT



NON-CORROSIVE . . . INSULATING

★ The popularity of Payne "A" Gas Vent is increasing. Tests and installations have proved its adaptability for venting gas appliances under almost any climatic or structural condition. Products of combustion from natural or manufactured gas have no deteriorating effect on the 99% pure aluminum inner tube of Payne "A" Vent.

For exposed or concealed installation, the efficiency of Payne "A" Vent has been definitely established. The illustrations show two difficult venting problems where Payne "A" Vent was used to replace an unsatisfactory material, absolutely eliminating difficulties with condensate.

The high quality of materials used in its manufacture, the complete insulation, its strength, non-breakable construction and ease of installation have made Payne "A" Gas Vent the most desirable gas vent on the market. Its without an equal in the field.

Ask for descriptive circular

PAYNE FURNACE & SUPPLY COMPANY
BEVERLY HILLS, · CALIFORNIA

monthly records and for total sales performance throughout the entire contest.

Average total installations for individual leaders in sales for the whole period of the campaign were 60 refrigerators. Awards ran as high as $100 for first position down to $10 for the 10th position. All final retail sales leaders who made a better-than-average record received either the first or second year gold Medal of Merit.

Individuals at the top—the hundred dollar winners—in their respective divisions were: J. F. Onley, Washington Gas Light Co., Thomas Green, Providence Gas Co.; Larry A. Deabler, Hartford Gas Co.; J. B. Billard, Cumberland and Allegheny Gas Co.; Theodore B. Sills, Manufacturers Light and Heat Co. (New Castle-Ellwood City District): W. R. Bales, Ohio Fuel Gas Co.; E. V. Bowyer, Lynchburg Gas Co., and E. H. Enochs, Arkansas Louisiana Gas Co.

■ ■

Semet-Solvay Gets Contract For Water Gas Machine

The Sioux City Gas and Electric Co. has awarded a contract to the Semet-Solvay Engineering Corp. of New York, for the building and erection of a nine foot Semet-Solvay carbureted water gas machine. The machine will be equipped with backrun and will be connected to a waste heat boiler. The superheater will be filled with Semet-Solvay eight-point checkerbrick. A 24-in. three-way backrun valve of newest design will be provided.

Rockwell, Bruyoux Visit Pacific Coast

TO gain first-hand information regarding latest developments in gas operations, Anthony Bruyoux of Brussels, Belgium, has just completed a tour of the United States. He was accompanied to the West Coast by Colonel W. F. Rockwell, president of the Merco Nordstrom Valve Co. and Pittsburgh Equitable Meter Co., where they attended the recent convention of the Pacific Coast Gas Association.

Mr. Bruyoux is the European representative of these two companies. He inspected a number of gas plants and production fields during his American visit. Within a few weeks he expects to be joined in Europe by Colonel Rockwell, who will fly there on the Hindenburg this fall. Plants for the manufacture of Nordstrom Valves have been opened in England, France and Germany to supplement the production of the Oakland and Pittsburgh factories.

■ ■

Seattle Co. Plans Gas Attack In Sales "War"

ITS big sales offensive of 1936, the new business department of the Seattle Gas Co., Seattle, Wash., under command of Norbert O. Fratt has declared a five-weeks war featuring a prolonged gas attack on all radical elements striving to convince people that other fuels than gas are more up-to-date. Starting the "War Deciared" campaign with an army of employee-soldiers ranking as privates, Commander Fratt hopes that each one will secure seven new customers and promote himself to the rank of general. Sale of one customer promotes a private to a corporal, gives him pay of $1.00. Sale of two customers makes the corporal a sergeant with $1.25 pay, and so on up to the rank of general with pay of $2.50.

Organized in true militaristic fashion, the campaign offensive divides the company into 10 divisions, each headed by a potentate and assisted by several aides de camp. Maps of the various sales objectives were posted in shop, plant, and office, and all employees were urged to enlist before they were drafted.

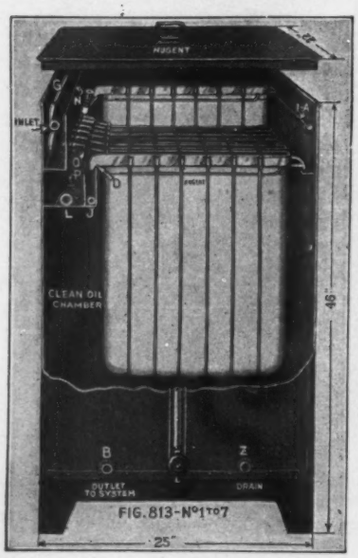
■ ■

Oregon Co. offers Consumers 49 Per Cent Rate Reduction

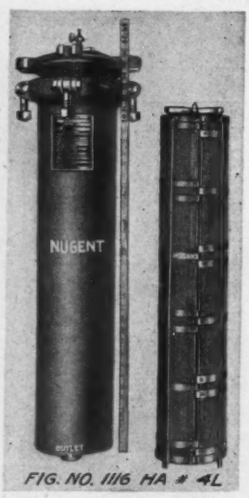
Saving its customers up to 49 per cent on water heating bills, the Southern Oregon Gas Corp., Medford, Ore., recently announced a new rate reduction schedule, according to D. E. York, vice-president and general manager of the company. Under the new rate 17.6 therms of gas will cost $2.50 or $2.41 less than under the supplanted rate.

Any domestic gas consumer occupying a single family residence or a separately metered flat or apartment is entitled to the lower rate on application, if he is using or will use an approved automatic storage heater for his entire hot water requirements. Gas for other domestic purposes is also included under the new schedule.

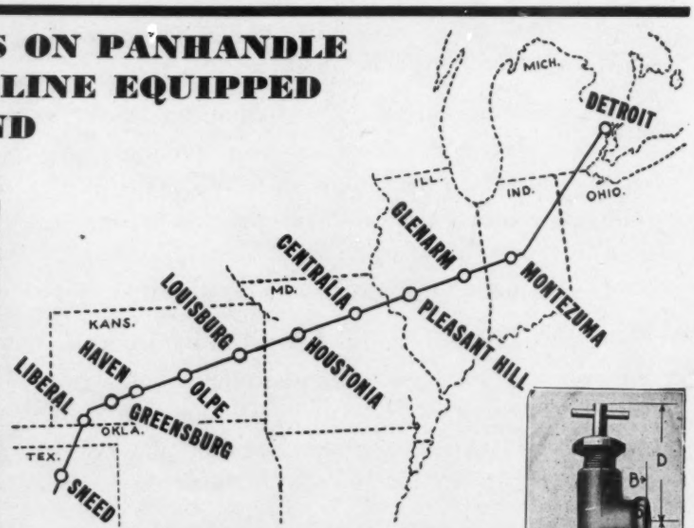
GIANT COMPRESSOR STATIONS ON PANHANDLE EASTERN NATURAL GAS PIPE LINE EQUIPPED WITH NUGENT OIL FILTERS AND OILING SYSTEMS



24 GRAVITY FILTERS INSTALLED



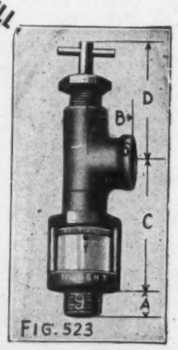
26 PRESSURE FILTERS INSTALLED



All the oil used on the bearings of these 38 mighty Cooper-Bessemer and Worthington engines is filtered through NUGENT OIL FILTERS and used over and over again. NUGENT SIGHT FEED VALVES having removable sight glasses for easy cleaning without stopping the oil flow, feed the proper amount of oil to each bearing.

NUGENT OILING and FILTERING SYSTEMS were used on the Chicago Line . . . and now are being installed on the Panhandle Line serving Detroit, Mich. This is a tribute to NUGENT DESIGN . . . NUGENT PERFORMANCE . . . and NUGENT EXPERIENCE based on MORE THAN 30 YEARS OF SERVICE.

Write for Illustrated Bulletins



700 Nugent Sight Feed Valves Installed

Wm. W. Nugent & Co., Inc. Mfrs.

407 N. Hermitage Ave. Established 1897 Chicago, U. S. A.

Compressor Plants

(Continued from Page 56)

312-K.V.A. Electric Machinery Corp. generators are being installed.

Field construction of the compressor stations and the gasoline dehydration plant has been contracted. Ground was broken on the first plant on April 29, the other following at short intervals, and it is anticipated if construction schedules can be maintained, that the first compressor station will be ready for operation about September 10 with the last ready about October 15. The Fluor Corp. of Los Angeles is the contractor on stations in Kansas and Texas, and Arthur G. McKee of Cleveland is building the stations in Missouri and Illinois. The Stearns-Rogers Manufacturing Co. of Denver, Colorado, is handling the construction of the gasoline and dehydration plant.

The compressor stations were engineered and designed by George S. Young, George T. Koch and J. S. Stevenson, working under the direction and supervision of B. R. Bay, vice-president and general manager of the Panhandle Eastern Pipe Line Co.

■ ■

Industrial Detroit

(Continued from Page 18)

units and consumed 731 thousand Detroit Gas Units in 1935. In some of the plants as many as 75,000 men are employed.

The rate adopted for large volume sales is the following:

Detroit Gas Units* per Month		
First	200 or less	$120
Next	300	48c per unit
Next	1,500	37c per unit
Next	3,000	35c per unit
Next	5,000	32c per unit
Next	10,000	29c per unit
Over	20,000	26c per unit

* 530,000 B.t.u. per Detroit Gas Unit.

■ ■

A.G.A. Committee Reports On House Heating Problem

"A STUDY of the Economics of Gas House Heating," the final report of the House Heating and Air Conditioning Committee of the Commercial Section of the American Gas Association is now available, according to an announcement by Alexander Forward, managing director of the Association.

The report comprises a detailed study of the costs and expenses involved in obtaining, supplying, and holding house heating business, and is offered as an aid to all gas company department heads in charge of these activities.

Purpose of the report is to present a method of analyzing the house heating business; to show how the cost of service is derived; to provide a means of developing a rate which will get the business and to indicate a method of determining the point of saturation where a maximum return exists. Although care has been taken to deal with the fundamental factors which were deemed typical of average conditions in the industry, the report is flexible and is designed to enable individual companies to apply it to particular situations.

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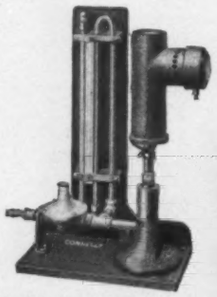
San Francisco, California



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**SIMPLE
ACCURATE
CONVENIENT**

A direct reading BTU Indicator. No corrections or calculations are required after calibration. No lag in reading. May be used on any kind of gas. Especially valuable on Mixed Gas.

Illustrations show Caloroptic fitted with Photronic cell for use with Connelly Distant Signal Unit which indicates direction and amount of any change. When the set limits are exceeded, lights show and alarms are sounded.

\+ + +

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N. E. Agt.—Theo H. Piser, Wellesley Hills, Mass.

SERIES

10

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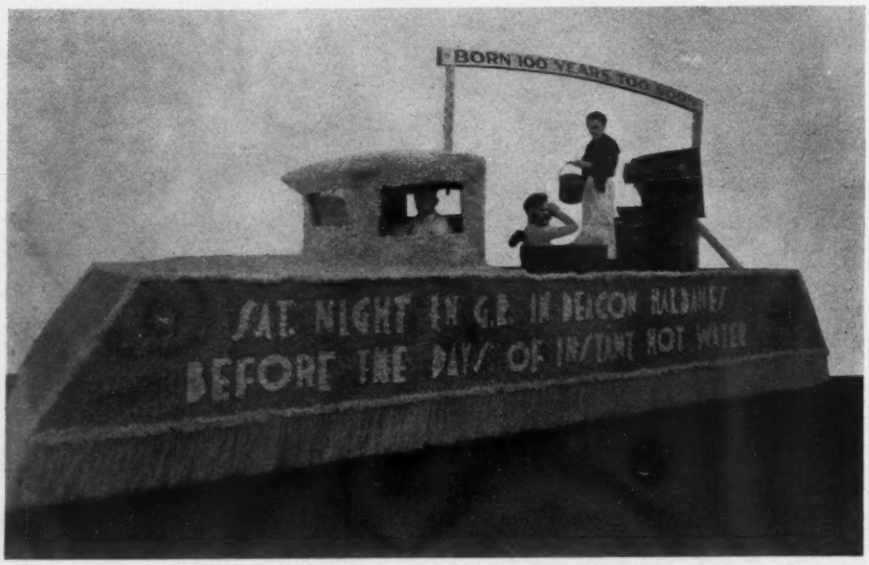

Grand Rapid Co.'s Tub-Scrubbing Float Commemorates Hot Water Heater

LAUGH-provoking and original among the string of beautiful and solemn floats in the several-miles long Furniture Centennial parade in Grand Rapids, Mich., last month was the entry of the Grand Rapids Gas Light Co. (see above).

Wishing to tie-in the float with its extensive drive on automatic water heaters and still not violate the parade committee ban on display advertising, the company constructed a float that accomplished both aims. In keeping with the centennial celebration commemorating the historic Deacon Haldane, first cabinet maker in that renowned city of fine furniture, the company entitled its float, "Born 100 Years Too Soon." On the platform of the truck appeared an old wood burner stove, a huge wooden kettle, basin, chairs, etc. In the tub sat a huge and apparently naked young man, mustached and sideburned, scrubbing himself vigorously, while his good wife in a costume 100-years old busied herself transporting hot water from the stove to the tub, taking time off now and again to scrub his ears and back.

Key to the advertising hook-up was the caption on the side of the truck: "Saturday Night in Deacon Haldane's Time Before the Days of Instant Hot Water." So effectively had the company's newspaper advertising campaign prior to the centennial popularized the slogan, "Refresh yourself with instant hot water," that the spectators were fully aware of the selling implication presented.

Ice Advertising Resultful; Campaign to Carry on

OF interest to gas refrigeration merchandisers was the decision of the directors of National Ice Advertising, Inc., at a meeting in Chicago last month to raise $600,000 to finance the 1937 advertising campaign. Refrigeration manufacturers will supplement this fund with $130,000.

At the meeting it was unanimously agreed that the $500,000 budgeted to 1936 ice advertising had succeeded in making the public "ice conscious." In the ice refrigerator field all sales records were broken during the first six months of the year. Refrigerator manufacturers reported that department stores and refrigerator dealers were seeking retail fanchises for air-conditioned ice refrigerators, due to the public interest created by the program. Distribution heretofore has been principally through ice dealers.

Tentative plans for advertising in 1937 include a 15-minute morning program appealing primarily to women, with a nationally known home economist at the microphone. A half-hour evening program, with entertainment for the whole family, will be broadcast once each week, supplemented by magazine advertising in leading general and trade publications.

■ ■

Brooklyn Union Inaugurates 5-Year Finance Plan

To aid New York residents in acquiring such modern gas appliances as the automatic gas range, refrigerator, water heater, and house heating boiler, the Brooklyn Union Gas Co. has inaugurated the first five-year retail financing plan to be introduced in the Metropolitan New York area. Under the new plan it is estimated that the average consumer can buy all four of these modern appliances for $2.58 per week. Cost of operating the appliances is $4.36 per week, making a total expense for a five-year period of $6.94 per week. These figures are based on an average customer gas consumption of 350,000 cu. ft. per year for house heating. Many homes average only 200,000 cu. ft., and this would reduce the cost 40 per cent.

BUTANE-PROPANE NEWS

IMPROVEMENTS IN PROPANE RANGES

By W. Z. FRIEND
Philgas Department
Phillips Petroleum Company

DECIDED improvements have been made during the past two years in the efficiency and operation of gas ranges for use with liquefied petroleum gases. Much of this development has been due to the formation, late in 1935, of a joint Committee on Requirements for Propane Appliances representing the Compressed Gas Manufacturers Association and National Bottled Gas Association. This Committee was formed as a result of an agreement between the propane industry through its two trade associations and the American Gas Association Testing Laboratories whereby the latter was designated as the official appliance testing agency of the industry, and the industry in turn was given representation on a number of the Requirements Sub-Committees of the A.G.A.

Prior to the beginning of the above arrangement, several of the larger distributors of bottled gas maintained their own appliance testing laboratories and a manufacturer often had to have his appliances tested in each of the separate laboratories in order to obtain widespread approval. The designation of the A.G.A. Laboratories as the official testing agency not only eliminates this duplication of expense and resulting confusion, but offers the propane industry the benefit of the development work being carried on by A.G.A. Laboratory on appliances for other gases, as well as propane. In addition, the laboratories of the individual distributors, now freed from much routine testing, have more time for fundamental work on appliance research and development.

Through its representation on the important A.G.A. Approval Requirement Sub-Committees, the propane industry has with the valuable assistance and cooperation of the other members of these Committees and the officials of the A.G.A. Laboratory been instrumental in obtaining revision of the approval requirements for propane appliances so that they incorporate the latest developments in appliance design and efficiency. Then, by requiring A.G.A. approval on ranges and other appliances to which bottled gas service is connected, the industry has strongly fortified itself against the encroachment of competing fuels.

Since it furnishes the utilization means for the greater part of the bottled gas load, the gas range has naturally received the most attention in the development work to date. This development has been largely concentrated on three major items: (1) increased top burner efficiency, (2) increased oven and broiler efficiency, and (3) lower oven temperatures.

Top Burners

Although a great deal of effort has been devoted by various laboratories and individuals to the improvement of burner design itself, it has become evident that even greater possibilities for increase in efficiency lie in reducing the amount of heat lost by radiation, convection, and conduction from the burner and surrounding top-section. In order to be more explicit, the principal sources of heat loss can be enumerated in the order of their importance:

1. Heat loss due to excess secondary air.
2. Heat loss by conduction from top grate to top structure.
3. Heat loss to metal parts by radiation from flames and flue gases.
4. Heat loss by convection from hot flue gases scrubbing top plate and frame surfaces.
5. Improper design of grates and flame impingement on grate arms.

The manufacturers who have set about to develop the highest possible efficiencies with propane in the top burner sections of their stoves have usually done so by all or part of the following means:

1. Using burner bowls with spacing around the burners carefully shaped to limit secondary air to the minimum which will allow proper combustion.

2. Insulating the burner bowl and the top grate from the stove top by various means and in some cases the separation of grates and bowl into several ports to break up the conduction of heat as far as possible.

3. Making the grate as light as possible and still retain rigidity when subject to flame, and carefully designing grates so that there is no flame impingement on grate arms.

4. Carefully spacing burner below top of grate so that more rapid heat transfer to cooking vessel is secured without interfering with proper combustion. This distance is usually about ¾ in.

5. Very careful design of port area so that number and spacing of ports is suitable for perfect combustion at all loads from low turndown to full on. To secure this result with propane usually requires that the burner have raised ports—at least that the port depth be greater than for other gases and at least 3/16-in. deep, preferably ¼-in or more.

6. Many manufacturers are now using a doughnut type burner with the ports drilled at angles or from 22- to 45-degrees from the horizontal to permit good secondary air entrainment, minimum burner spacing and good heat distribution over the bottom of the cooking vessel.

7. Burners and burner bowls of bright finish have been found to increase efficiency by reflection of part of the heat from the burner up against the vessel.

8. Most of the efficient propane ranges now are using at least two top burners of the combination simmer type with a range of turn-down on both regular burner and simmer. This type of burner is of particular value with propane since it permits a much lower temperature on turn down, and at the same time a stable flame.

Stoves have been tested which, due to proper combinations of the above characteristics, gave efficiencies by the A.G.A. test method as high as 60 per cent with propane. The number having efficiencies from 50 to 55 per cent is so great that the range requirements have recently been changed to require a top burner efficiency of at least 50 per cent.

Ovens and Broilers

The adaptation of oven and broiler burners to propane has usually presented to the range manufacturer a much greater problem than that of the top burners. It has in some cases required an entirely different burner. This has been due to the fact that the following requirements are necessary for proper combustion and operation with the propane burner:

1. The ports must be raised or at least be 3/16 to 3/8 in. deep to obtain proper combustion.

2. The ports must be close enough together to obtain rapid chain lighting of the burner with the small volume of propane passed, and at the same time the total port area must be kept within proper limits.

3. A stable flame must be maintained at minimum temperature setting; minimum temperature should not be higher than that obtainable with manufactured gas, yet the oven heating-up speed should be as great as with other gases.

4. The combustion range of propane being very narrow (from 90½ per cent to 97½ per cent air required for combustion) burner design, with respect to venturi throat area, length of throat, total port area, and other items must be unusually accurate.

After testing large numbers of stoves in which the standard oven and broiler burner

castings have been adapted in one way or another for propane use, it is the opinion of the bottled gas company testing laboratories that such adaptations are generally not entirely successful and numerous stoves have been tested which could not conceivably be used on propane.

The best answer to this problem to date has been the dual oven burner, in combination with the graduating thermostat or the snap-action thermostat. One example of the former type employs a burner of two sections entirely separated from each other, both sections controlled by a graduating thermostat above an oven temperature of approximately 300°F. To maintain lower temperatures than this, one-half the burner is automatically shut entirely off by a gravity valve actuated by fall in pressure through the thermostat. After this, the half of the burner still burning is controlled by the same graduating thermostat.

The burner used with the snap-action thermostat is divided into two separate parts, one usually being in the form of a sub-burner, and capable of maintaining alone an oven temperature of around 200°F. In operation both sections of the burner are on full until the set oven temperature is reached, when the snap-action thermostat completely closes off the main portion of the burner and leaves the sub-burner on full. The larger portion snaps on and off to maintain the desired temperature, lighting when it comes on from the constant burning sub-burner.

Several thousand propane stoves have been installed during this year, using one or the other of the above oven burners and their operation has been entirely successful. Minimum temperatures of 200°F. or lower are easily maintained, permitting low temperature cooking and oven canning not possible with propane before. At the same time, these ovens can be heated from a cold start to 500°F in 12 to 15 minutes. The efficiencies of these ovens are usually high because they can deliver the heat at exactly the rate it is needed.

In this connection, a further saving can be obtained by making the inside lining of the oven black on the outside and bright on the inside, so that it will absorb a maximum of heat coming up around it from the burner and at the same time reflect a maximum amount of heat on the inside of the oven back onto the food.

The possibilities of foil type insulation for ovens is now being studied with the idea of providing good oven insulation without the necessity of heating up a large quantity of insulating material, as in the case of the conventional range at the present time.

Another means of providing low turn-down and high maximum input in the same burner, which has been tried out to some extent, is by use of a ribbon type burner. This has possibilities and warrants further development.

Developments in broiler burners have generally followed developments in oven burners because the two are still usually the same burner, for reasons of economy in construction. However, it has been true that such burners have not been satisfactory broiler burners, because limited in B.t.u. output and heat distribution by the minimum temperature requirements of the oven. It appears at this time that individual oven and broiler compartments and burners, each designed to perform the work for which it is intended, hold the most promise in improving both oven and broiler performance and efficiency, even though they seem to call for more expensive construction. Some development has been made along this line and those ranges which have been most successful in this respect have incorporated the following elements of broiler design:

1. A fully insulated compartment properly vented.

2. A burner of proper size and shape to accommodate ordinary domestic requirements.

3. A burner capable of handling a higher gas input than that of most oven burners.

4. Some form of refractory or other radiant material to permit placing food in a high temperature zone without being directly in the flame.

5. Provision for adequate secondary air for good combustion.

6. Uniform temperatures under all parts of the broiler burner.

7. Some practical means of searing both sides of meat simultaneously.

8. Broiler compartment so designed as to prevent heat leakage to, or high temperature in the top burner box.

9. A rack and tray easy to clean.

By divorcing the broiler and oven burners, the latter is permitted to have lower maximum heat input together with less secondary air circulation thus permitting the use of smaller oven vent areas. Such reduction in vent areas within the limit prescribed for good combustion results in greater oven speed and less heat loss. The use of a separate oven burner also permits an "up" flame, which results in less heat loss to the oven bottom, thus producing greater oven speed and increased efficiency.

In the past it has not been customary to equip propane ranges with automatic top lighters, because of the high B.t.u. consumption of available lighters when burning a stable flame. Stable top burner propane lighters have, however, recently been developed, having a gas consumption of only 150 B.t.u. per hour. The operating cost of such lighters is within reason and an increasing number of ranges are being equipped with them.

A number of specifications of value in designing a range or burner for propane gas are presented below. These are in the nature of suggestions based upon a wide experience in testing and design of propane appliances.

Suggested Specifications For Propane Ranges

1. *A.G.A. Approval Requirements for Gas Ranges:* These suggested specifications are not intended to conflict in any manner with the A.G.A. Approval Requirements for Gas Ranges (A.S.A. Z.21.1-1935 with revisions effective March 1, 1936, and all subsequent revisions), but to represent good construction practices for meeting these requirements.

Kerotest Type 133
Diaphragm Packless Valve

KEROTESTS
the ideal valves for modern propane gas service

Incorporating the famous Kerotest Diaphragm Packless design, these strong, pressure-tested valves can be inspected or repaired while under full pressure without interrupting service from the line—thus extending their service indefinitely. They are listed as standard by the Underwriter's Laboratories and are available with or without handwheels. Try them on your next job.

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Single stage regulation—one diaphragm. Operates on Butane or Propane. Converts high pressure liquid gas into a dry gas at atmospheric pressure with 100% shut-off. Only one moving element with large bearing area. One simple adjustment only. Rugged in construction. Moderate in price.

Barton Brown Engineering Corporation, 1109 Santa Fe Ave., Los Angeles

The A.G.A. Requirements should always be complied with first.

2. *Gas Burner Valves:* Gas burner valves should be of good construction, spring loaded, and ground with exceptional care. They should be lubricated only with lubricants commercially suitable for liquefied petroleum gases, such as Dixon's Hiheet Graphite, or similar.

3. *Orifices:* Only fixed orifices should be used. The customary sizes of orifices used are as follows:

a. Regular top burner—No. 70 (5600 B.t.u. per hr.)
b. Giant top burner—No. 68 (6900 B.t.u. per hr.)
c. Single oven burner; Separate broiler burner — No. 56 to No. 54 (15,500 B.t.u. per hr. to 21,500 B.t.u. per hr. depending upon size of oven or broiler.)
d. Dual oven burner—No. 56 to No. 54 for main burner and No. 80 for subburner.

4. *Joints:* Compounds used on threaded joints, of gas piping should be impervious to attack by propane. Recommended materials are "Petroseal," "Stalastic," "Gaskolac", shellac, or similar substance.

Unions in gas lines on ranges should be of a ground joint type.

5. *Burner Design:* In many cases it is possible to use the same burner castings for propane as for manufactured or natural gas, if correct port design is used. However, to insure best operation with propane, the burner should be designed for the purpose for which intended and in accordance with the principles and dimensional relationships described in Chapter VII of A.G.A. Handbook on Combustion (Third Edition).

6. *Port Design:* Burner ports should not be greater in size than 32 drill size, nor smaller than No. 48. Ports may be either flush or raised, although the latter is much preferred. The thickness of metal through which the ports are drilled should be not less than ¼ in. for No. 32 and No. 34 ports and not less than 3/16 in. for No. 36 or smaller diameter ports, (¼ in. minimum is preferred for all sizes with greater depth desirable if available). The number of ports should be sufficient to provide for a maximum gas rate not exceeding that specified in table No. 1.

7. *Top Burners:* Top burners should usually be placed about ¾ in. below the grates. A smaller spacing is permitted when the top burner ports are drilled horizontally or at a slight angle therefrom. Combination simmer burners with separately controlled simmer are preferrable on at least two of the burners. Position of oven burners is standard.

8. *Lighters:* Both spreader and flash type lighters are being used successfully for top burners. The principal objection to many lighters using a continuous standing pilot is high cost of operation. A suitable lighter now being used on propane ranges has an orifice .004 inches in diameter and burns 150 B.t.u. per hour. Any lighter used should be capable of satisfactory operation at a gas rate of 250 B.t.u. per hour or lower. The

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Back of these important factors lies the efficiency of design, workmanship and raw materials of Hackney cylinders.

Because Hackney cylinders are light on weight and heavy on strength, they are preferred two to one against all others combined. They carry Butane, Propane, and Butane-Propane mixtures for virtually all the leading companies in this field.

Hackney MILWAUKEE

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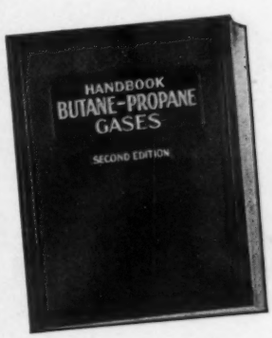

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Write for circular describing contents in detail.

TABLE NO. 1

Port Size	Diam. Inches	Area Sq. Inches	OPTIMUM[1] or PREFERRED B.t.u./Hr. Per Port	OPTIMUM[1] or PREFERRED B.t.u./Sq. In. Port Area	MAXIMUM[2] or MOST ALLOWABLE B.t.u./Hr. Per Port	MAXIMUM[2] or MOST ALLOWABLE B.t.u./Sq. in. Port Area
54	.0550	.00238	51	21,400		
52	.0635	.00317	62	19,900		
50	.0700	.00385	71.6	18,600		
48	.0760	.00454	78.5	17,300	111	24,400
46	.0810	.00515	83.5	16,200	119.5	23,200
44	.0860	.00580	87.5	15,100	122	22,100
42	.0935	.00687	92.7	13,500	138	20,100
40	.0980	.00754	97	12,870	143	19,000
38	.1015	.00809	101	12,500	148	18,300
36	.1065	.00891	109	12,200	155.5	17,450
34	.1110	.00968	116	12,000	163.7	16,900
32	.1160	.01057	126	11,900	175	16,530
**30	.1285	.01296	150	11,600	208.5	16,100
28	.1405	.01549	176.5	11,400	244	15,750
26	.1470	.01697	190	11,200	264	15,550

**Sizes No. 30 and larger should not be used for stove burners. Size No. 30 is the largest size that should ever be used for water heater burners. Sizes No. 28 and No. 26 may sometimes be necessary for industrial burners. The three sizes mentioned above are likely to allow the burner to flash back and burn in the mixing chamber whenever the burner is throttled or turned out.

1. Optimum values are generally used for top burners.
2. Maximum values are generally used for oven burners.

gas line to the pilot light should be provided with some accessible device to easily shut off the gas supply to the pilot.

9. *Oven Heat Controls:* Standard graduating or snap action thermostats with suitable high temperature lubricant or stem sealing grease are satisfactory. For pilot light use open ended 1/16 in. I.D. tubing (or equivalent) with fine needle valve adjustment near open valve. Pilot without valve and with fixed orifice on tip is not satisfactory. Pilot tube should be rigidly supported so that flame will be slightly below and in line with gas flow from oven burner ports. Needle valves must have long, tight-fitting threads to avoid leakage of propane through the threads. The inlet should be under the needle seat so that the reduced or downstream pressure will be against the stem threads.

10. *Clock Control:* Most ranges having clock control of oven lighting which have been tested to date, have not given dependable operation. This type of control is not recommended for propane ranges.

11. *Automatic Devices to Prevent Escape of Unburned Gas:* Every gas range furnished with means for automatic ignition of the gas at the oven and/or broiler burner must be equipped with a device which will automatically shut off the gas supply to the oven and/or broiler burner and to related sub-burners and pilot burners in the event that (1) the means of ignition becomes inoperative, and/or (2) the means of keeping the valve of the device open becomes inoperative.

The program of domestic gas appliance research now being carried on by A.G.A. Laboratory together with the investigations being conducted on the same subject by the laboratories of individual liquefied petroleum gas distributors, will undoubtedly result in a great many additional improvements in propane appliances in the immediate future. The effect of this development should be to lower the cost and consequently greatly increase the utilization of bottled gas service.

■ ■

Massachusetts Companies To Distribute Bottle Gas

Buzzard's Bay Gas Co., Wareham, Mass., and Barnstable Gas Co., Hyannis, Mass., both properties of T. Russell Robinson Management, Inc., of Boston, announced August 12 that they would begin immediate distribution of bottled gas on Cape Cod.

A monthly delivery service will be rendered to customers, making use of a cylinder change-out system. The product will be sold under the trade-name "Redigas".

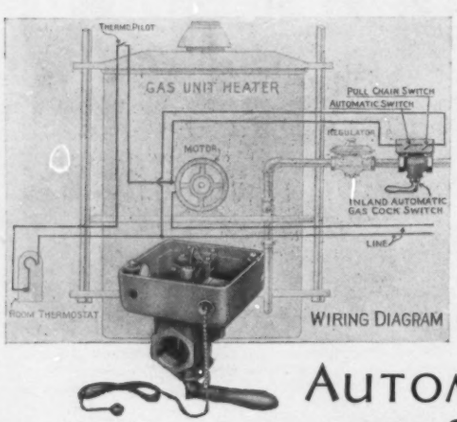
Aside from the revenue derivable from the distribution, one main purpose of the gas companies is to hold the customer load against electricity and other competition pending the possible future laying of gas-main extensions.

■ ■

Utility Assn. Committee Makes Convention Plan

The executive committee of the Wisconsin Utilities Association at its final meeting of the past fiscal year decided for convention purposes to merge the Gas Division of the Technical and Operating Section with the Gas Division of the Commercial Section and also to merge the Electrical Division of the Technical and Operating Section with the Commercial Section. During the ensuing year two joint conventions will be held by these merged divisions.

During the year recently closed three conventions were held with an aggregate registered attendance of 703. More than 50 conferences of various committees were conducted.



YOU CAN SELL *More . . . .* UNIT HEATERS *With this . . .* AUTOMATIC GAS COCK *And* SUMMER SWITCH

A real sales stimulator! Simple . . . safe . . . automatic . . . it makes unit heaters available for ventilation in the summer. When gas cock is turned off, pilot and thermostatic controls are automatically cut out and fan is then controlled by pull chain, or remote switch if preferred. Ask for full details—write today for illustrated folder describing this and other Inland Gas Specialties.

INLAND GAS SPECIALTIES

INLAND MANUFACTURING COMPANY

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DISTRIBUTORS: Los Angeles, Calif., Harry V. Payne; Atlanta, Ga., Clow Gasteam Heating Co.; Boston, Mass., Herbert H. Skinner; Dubuque, Iowa, A. Y. McDonald Mfg. Co.; Lakewood, Ohio, Harry L. Powers.

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Load Building News

P. C. Gas G. A.

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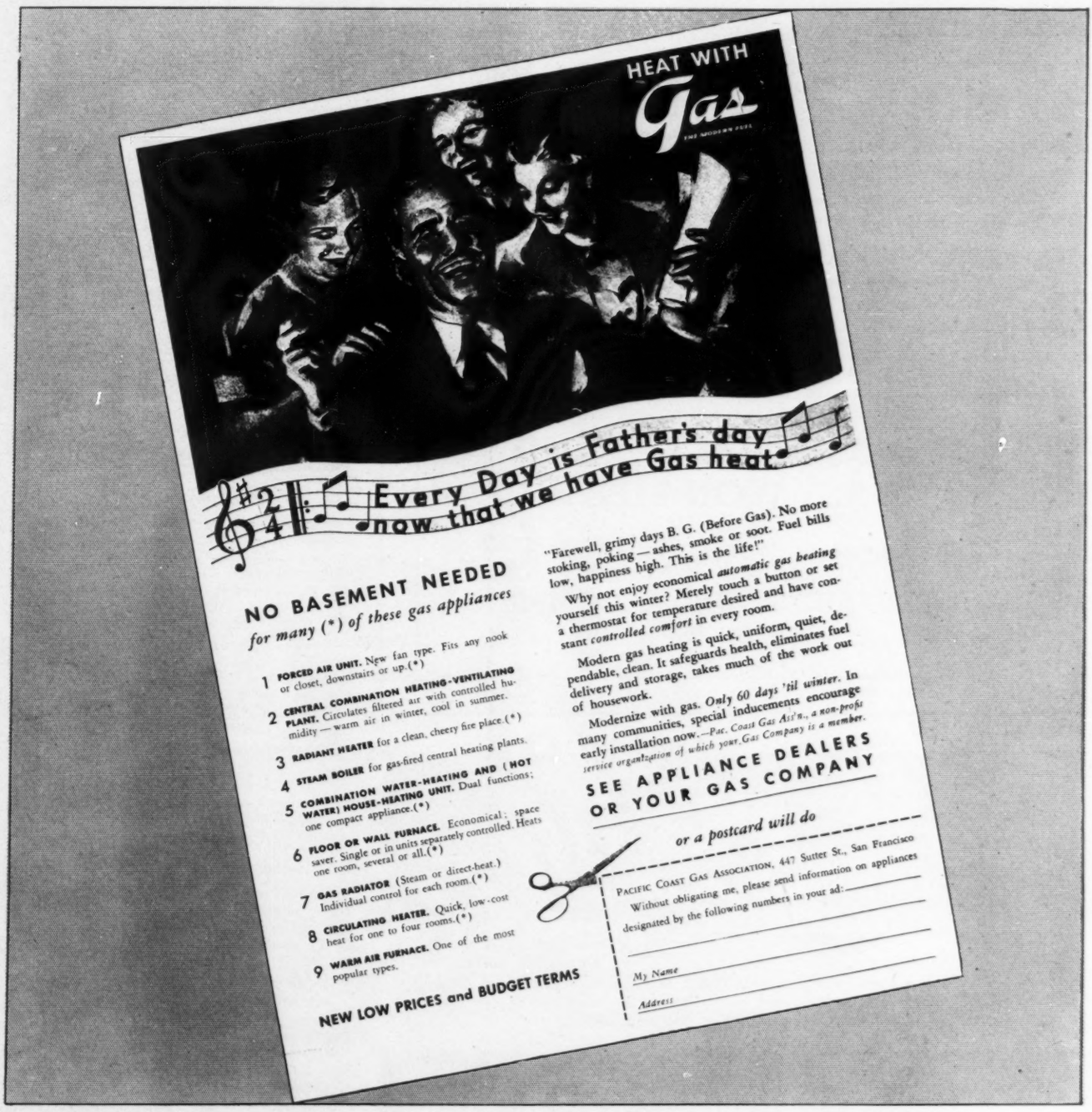
Eighth consecutive year of regional cooperative advertising, Pacific Coast Gas Association

SEPTEMBER MAGAZINE "COPY" SUPPORTS COASTWIDE SPACE-HEATING DRIVE BY UTILITIES AND DEALERS


HEAT WITH Gas
THE MODERN FUEL
Every Day is Father's day now that we have Gas heat
NO BASEMENT NEEDED
for many (*) of these gas appliances
1 FORCED AIR UNIT. New fan type. Fits any nook or closet, downstairs or up.(*)
2 CENTRAL COMBINATION HEATING-VENTILATING PLANT. Circulates filtered air with controlled humidity — warm air in winter, cool in summer.
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9 WARM AIR FURNACE. One of the most popular types.
NEW LOW PRICES and BUDGET TERMS
"Farewell, grimy days B. G. (Before Gas). No more stoking, poking — ashes, smoke or soot. Fuel bills low, happiness high. This is the life!"
Why not enjoy economical automatic gas heating yourself this winter? Merely touch a button or set a thermostat for temperature desired and have constant controlled comfort in every room.
Modern gas heating is quick, uniform, quiet, dependable, clean. It safeguards health, eliminates fuel delivery and storage, takes much of the work out of housework.
Modernize with gas. Only 60 days 'til winter. In many communities, special inducements encourage early installation now.—Pac. Coast Gas Ass'n., a non-profit service organization of which your Gas Company is a member.
SEE APPLIANCE DEALERS OR YOUR GAS COMPANY
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Without obligating me, please send information on appliances designated by the following numbers in your ad:
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Cooking Test Proves Economy Of New Insulated Ranges

TO test the variation in gas consumption between an old fashioned range and a modern insulated range, the British Columbia Electric Power and Gas Co., Vancouver, B. C., Canada, subjected two such stoves to a cooking test, with the result that the modern stove effected a gas consumption saving of 30 per cent over the old fashioned type.

According to figures presented by the Home Service News, house organ of the company, the old model stove used 75 cu. ft., the new insulated stove, 57 cu. ft. The stoves were subjected to exactly the same test, both on the surface and in the oven. As a part of the test, a 7½ lb. roast was cut in half so that the two ovens would not only cook the same quantity of meat, but also meat from the same cut. For accuracy the meter gave the consumption in tenths of a cubic foot.

Reasons assigned for the difference: (1) The new range had a heat retaining insulated oven. The old range was not insulated and much heat was lost through the oven walls. (2) The new oven maintained a steady temperature using the minimum amount of gas through oven heat control. The old oven had to be regulated by hand. (3) The surface burners on the new range were covered; thus utensils were grouped around one burner, making use of the conducted heat.

■ ■

A.G.A. Directory Adds Data

Enhancing the usefulness of the American Gas Association's Directory of Approved Appliances and Listed Accessories, the July 1st edition shows, for the first time, the nominal storage vessel capacity in gallons of each A.G.A. approved storage gas water heater. This added information rounds out the essential data given for each certified model of water heating equipment. Over 1,225 models of approved water heating equipment are now listed in the Association's Quarterly Directory.

WANTED—Salesman for heating equipment. Salary and commission. State experience. Answer by mail only.

Williams Radiator Co.
1865-1873 Cordova St., Los Angeles, Cal.

HYDRAUGER

MODERN HORIZONTAL BORING MACHINE

For Underground Installation of Pipe and Conduits. Avoids damage to costly pavements and saves time. Send for Bulletin.

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"Cast without chill in a metal mold".

U. S. PIPE AND FOUNDRY COMPANY
Burlington, N. J.

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GENERAL CERAMICS COMPANY
· REFRACTORIES ·

For Conversion Burners, Circulating Heaters, etc.

Because they are uniformly accurate, strong, and dependable in every way, General Ceramics Refractories are used by most of the leading manufacturers of gas heating appliances. • Our engineers will gladly cooperate with you.

General Ceramics Company, 30 Rockefeller Plaza, New York

MODERN METHODS AND MATERIALS

A letter to GAS will bring you any of the selected reference bulletins listed below, without cost. Indicate by number which you desire.

NO. 139—GAS VALVE

Folder describing and illustrating with a cross section drawing the construction and operation of a modulating gas valve of wide range for application in controlling gas conversion or gas designed equipment.

NO. 140—AUTOMATIC CONTROLS

Catalogue covering a complete line of automatic control equipment for heating, air conditioning and refrigeration.

NO. 141—APPLIANCE REGULATORS

Folder on low pressure appliance regulators illustrated with cross section drawings. Contains performance charts and tables of dimensions.

NO. 142—SHOVEL CONTROL

Illustrated folder on a mechanical control for the operation of shovels, draglines and cranes.

NO. 143—AUTOMATIC VALVES

Circular describing automatic gas control valves for coffee urns, steam tables, deep fat fryers and other restaurant equipment. Illustrations show methods of installation.

NO. 144—COOLING TOWERS

Bulletin on cooling towers, illustrated with photographs and installation diagrams. Contains data for calculating tower size. Charts show capacity curves, wet bulb performance factor, tower height performance factor and windage loss vs. wind velocity.

NO. 145—FLOOR FURNACES

Booklet covering a complete line of floor furnaces gives detailed specifications and dimensions for installation. Construction and component parts such as burners, controls, etc., are described in detail and illustrated.

NO. 146—THERMOCOUPLE PYROMETERS

Fifty-two page catalogue describing thermocouple pyrometers also discusses the potentiometer method of measurement. Deals with various uses of the instrument for such applications as operation of signals, automatic control of liquid level, valve position, chemical strength, frequency, voltage, etc.

NO. 147—PLASTIC PACKING

Illustrated folder describing a general all-service packing with dry graphite lubrication that is available in spiral form.

NO. 148—BOILER

Leaflet on a round boiler available for either steam or water, describes construction and operation. Tables give ratings and performance data.

NO. 149—WELDED PIPE

Attractively compiled and illustrated 39-page booklet on spiral welded pipe. Contains charts and data tables showing various wall thicknesses, gauges and working pressures, also data on flanges, fittings and couplings. Gives loading information and freight data.

REDUCED GAS RATES
GAS BILL
Cut HEATING COSTS
HEATING COST CALCULATOR
Figure it out for yourself
20 000 A G A INPUT RATING
$1.20 HOURLY OPERATING COST
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New Reduced Gas Rates Save You Money

WE ORDERED 100,000...

LARGELY FOR YOU

They're off the press! We are now distributing 100,000 of these Heating Cost Calculators, largely through retail dealers.

Each page is given to one particular type of appliance—a picture and a brief description of what the appliance is and what kind of job it was designed to do.

The back cover is double, open at one end and punched with four little windows. Inside is a printed card.

The card is set by sliding it in or out until the figure in the top window corresponds with the A.G.A. rating of the appliance. This done, the figures in the lower windows will show the hourly operating cost.

As each of the cost figures is based on our new Reduced Rates, this little informative booklet is really a selling tool. Use it! It will prove for you that gas is cheap and that rates are fairly based on the quantity of gas used. It will help you sell not only gas heating equipment, but all kinds of gas appliances.

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PACIFIC GAS AND ELECTRIC COMPANY

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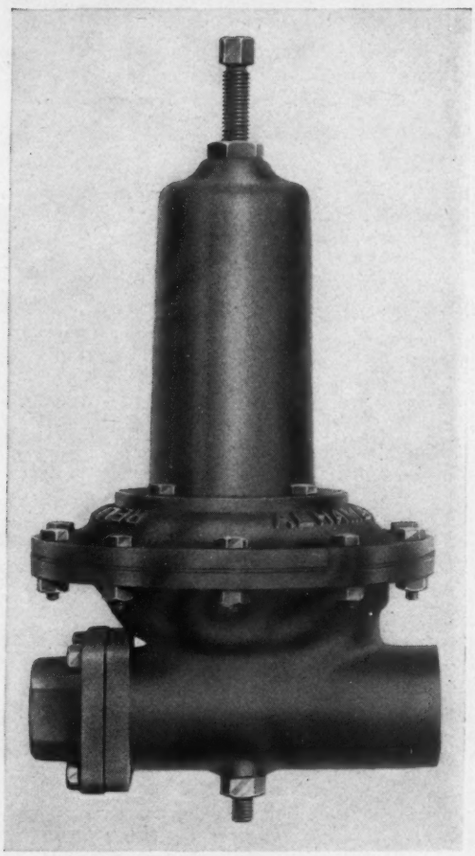
WG 209-936

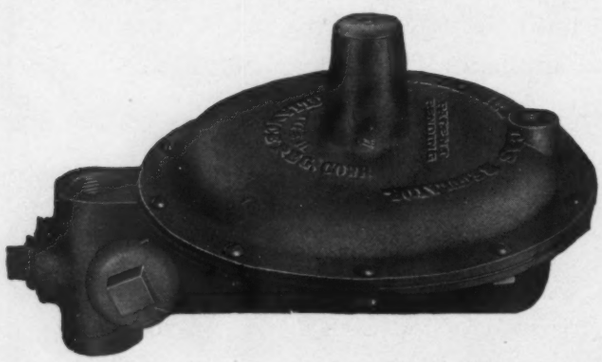
RELIANCE REGULATORS



Above. Reliance High Pressure Compounding Regulator. Fully Patented.

. . . Maintain Uniform Pressures

Reliance Regulators maintain uniform delivery pressures at extremely high rates of flow and have an exceedingly low lock up. Type "H" and Type "K" Regulators are made in spring loaded or dead weight types, with or without a mercury seal. Valve and valve seats are easily accessible for inspection and replacement through the hand hole, and adjustment for changing pressures is easily made.



Above. Type H or K Spring Loaded Regulator. Manufactured also in dead weight type. Patent No. 1,931,777.

The High Pressure Compounding Type Regulators in ¾", 1" and 2" sizes are for reducing extremely high inlet pressures to outlet pressures of from 2 to 75 pounds. They are extremely compact with high capacities and have a positive lock up.

RELIANCE REGULATOR CORPORATION

1000 Meridian Ave. Alhambra, California

MEASUREMENT and CONTROL

Pressure Regulation

By J. J. DELANEY

General Sales Manager, Reliance Regulator Corporation

MODERN gas pressure regulation is quite a complex problem in all its various phases of today's applications, but the fundamental principles are the same as employed when gas was first used. The original method of gas pressure control utilized a large cast body having a single valve, and this valve was attached to and actuated by a large floating bell sealed with water or other suitable fluid within a reservoir. The top of the bell was weighted to give the desired outlet pressure necessary for proper distribution. This type of regulator was only used on relatively low pressure control work and was limited because of the low blowing point of the fluid seal.

J. J. DELANEY

As industry progressed and higher pressures became necessary, and this is especially true when natural gas was first utilized, regulator designs had to change to keep pace with the times, and in order to secure higher pressure control, diaphragm chambers were used instead of floating type fluid sealed bells.

As the drilling of oil and gas wells progressed to a relatively shallow depth, and the pressures encountered were fairly low, regulator changes were being placed into effect to keep pace with the changed pressure conditions encountered, so that, today gas and oil wells are producing pressures up to 3500 lbs. per square inch, requiring suitable regulators made of various hard, tough metals to reduce these extremely high pressures from the wells to transmission lines, and still further to gas company distribution systems and individual households and appliances for proper utilization. Some of these extremely high pressures require four and five-step regulator reductions in order to properly control the gas along its path of distribution, and at all times the main function of the gas pressure regulator is to control the pressures safely and eliminate undue hazards of blow-ups or explosions.

Large Capacity Regulators

High Pressure Balanced Valve regulators were expressly designed to obtain large capacities through relatively small casting bodies, for a reason that is very readily understood as it is easy to imagine that where a single valve is employed an enormously large body would be required to pass a given large capacity. The single type of valve is what we term an unbalanced valve regulator, and where two or more valves are used, they are usually designated as balanced valve regulators. The unbalanced, or single valve regulator is readily comprehended in that high pressure exists on the one side of the valve and low pressure on the other side; whereas on the two or more valve regulator the design is such as to permit two or more valves working on a single valve stem. These are so constructed that the inlet pressure exerts a fairly close balance on the under side of the one valve as against the top side of the other valve, and consequently the name "Balanced Valve". However, this term is misapplied in that an accurate, true balance is not obtained due to the areas of the valves exposed being somewhat unequal; the top of lower valve which is usually exposed to the high pressure has a somewhat greater area than the under side of the top valve, which results in a slight unbalancing effect and the unequal distribution of the load between the two valves. It is not common knowledge, but is a definite fact, that in all types of balanced valve regulators the top valve assumes the greater load (approximately from 60 to 70% through the top valve, as against 30 to 40% through the bottom valve). This characteristic occurs regardless of the medium passing through the regulator.

As the prime function of a regulating unit is to reduce high transmission or distribution pressures to lower pressure for proper utilization, it is only natural that when the volume of gas has expanded while passing through the valves and into the low pressure side of the regulator chamber that the flow is extremely turbulent, and remains so until it finally becomes stabilized through its new pressure relation. The molecules of the gas in going through this expansion process, when the pressure is reduced, become quite turbulent and unruly as to the direction in which they are trying to be guided; consequently, due to this turbulence of the increased mass volume of the gas, a terrific amount of energy is wasted on the walls of the casting and on the working parts of the regulator, such as the valves themselves, valve seats and valve stem, etc. This turbulence tends to give results in time that appreciably wear the valve guides, spiders, and valve stem to where they are loose and wobbly and give poor regulating results. This condition is greatly magnified and occurs sooner when any abrasive matter is carried with the gas.

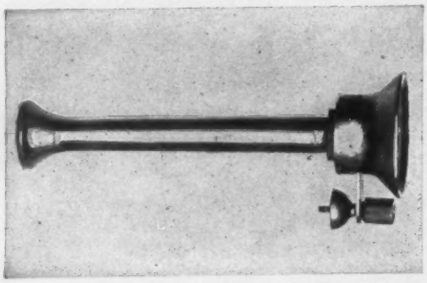
Most regulators are installed with little thought as to the kind of load they are required to handle, and are generally mistreated as to pressure ranges and volume expected of them. It is well to remember that everything about the regulators, with the exceptoin of the slight movement of the valve, is shaped into a definite size, and for this reason extreme care should be taken in calculating capacities of regulators to meet certain set requirements, both as to inlet and outlet pressure, specific gravities of the gas or other fluids, and flowing temperatures.

Types

The lever and weighted types of regulators have been the most commonly used in the past, but as transmission and distribution loads became more severe it was necessary to look for other means of counter weighting the diaphragm. Spring loaded and pilot controlled means then came into being. Before any of these, however, the dead weight type was first used, but this system employed such a tremendous amount of weights, where exceedingly high pressures were required, that it was soon discarded for high pressure purposes and the lever and weight system employed, where through the fulcrum action of the lever, a multiplied power could be exerted on the diaphragm by hanging weights at the end of the lever arm. On fairly steady and constant flows, and where inlet pressures do not vary greatly, this type of regulator is still very useful and gives extremely good results, but where load changes occur frequently and pressures vary over a wide range the action of this regulator is, under these conditions, too fast for the amount of suspended weight hung at the end of the lever, and naturally tends to produce a rapid movement of the diaphragm in one direction or another, and which movement is magnified at the end of the lever arm supporting the weights and results in the starting of pulsation, especially where the flow condition is such that the regulator does not have time to recover itself and allow the weights to regain their steady equilibrium.

Dash pots, using oil and other fluid mediums, have been attached to the lever arms of these types of regulators, with fairly good results, and usually pulsation can be eliminated with the use of this device. However, in order to eliminate the pulsations, the dash pot principle has been introduced, requiring a slow movement of the plunger in the receptacle holding the liquid. This added friction load causes sluggishness in the regulator, making it respond less quickly to varying flow conditions. Auxiliary bowls have also been used successfully in eliminating pulsation from this type of regulator. This auxiliary bowl usually consists of two castings clamped together with a diaphragm in between. The diaphragm stem of the auxiliary bowl is attached to the lever arm of the master regulator and pressure is introduced on the under side of the diaphragm in the auxiliary bowl,

FORSTER



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GAS BURNERS

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Tried, tested and proven on all natural, manufactured and liquefied gases.

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BERKELEY, CALIFORNIA

BALTIMORE AUTOMATIC SHUT OFF

THE *Accepted* SAFETY CONTROL FOR ALL PILOTED GAS BURNERS

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It is now available on many gas furnaces, boilers, conversion burners, water heaters, ranges, etc., offered by this country's foremost appliance builders.

The flexible, easily bent leads from the thermocouple to the electromagnetic unit make easy the application to ANY appliance. Order a single unit and see how easily this Super Safe Shut-Off will answer your safety pilot problem.

To appliance manufacturers:

Our Engineering Department and the MGSCo. Testing Laboratory are at your service to help you apply the BASO.

MILWAUKEE GAS SPECIALTY COMPANY
MILWAUKEE, WISCONSIN
Pacific Coast Representative
H. V. PAYNE, 3834 3rd Avenue
Los Angeles, California

resulting in a pressure cushion which helps to iron out whatever pulsations may occur in the master regulator.

Regulator Protection

All balanced valve regulators of either the high or low pressure types should be protected by installing a dirt collector or strainer ahead of the inlet to the regulator, so that as much dirt, scale, and abrasive matter as possible can be collected in the strainer to eliminate the passage of this material through the regulating equipment and temporarily reduce the wear on the regulator, and further insure better functioning of the regulator as a control medium, and as a lock-up device, when there is no flow existing. Abrasive matter cuts and scores the valves and the valve seat discs to such an extent that when a lock-up is required the regulator cannot function properly. Sometimes these strainers are designated as dust traps and are made of screen wire, horsehair bundles, flannel sacks, etc.—anything at all is usually all right, providing it removes the abrasive material. Even a slightly larger reservoir ahead of the regulator helps materially in slowing up the velocity of the gas, and allowing the foreign matter carried to fall to the bottom of the larger receptacle, and this foreign matter can usually be blown or drained from the receptacle at the operator's convenience.

Diaphragm Operation

Diaphragm heads on most present day makes of regulators can be quickly converted from one style to another, when change is required from lever weighted, spring loaded or pilot controlled, and vice versa.

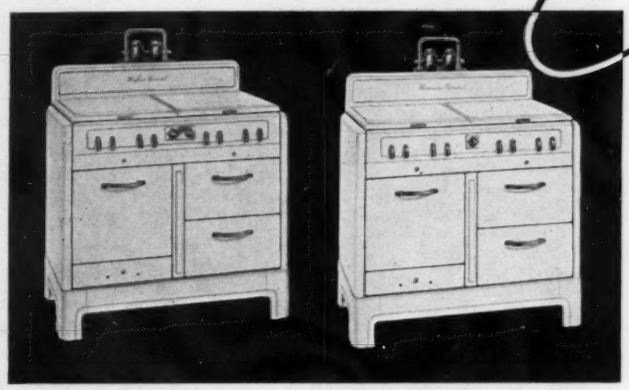
An equalizing line or pressure tube is provided in the regulator body proper, or downstream beyond the body, depending on the style, and transmits the low side pressure to the under side of the diaphragm, assuring control and allowing the regulator to follow the fluctuations in the low pressure line. This line functions so that if for any reason the outlet pressure tends to decrease, it will in transferring this change in pressure through the static line to the under side of the diaphragm, allow the actuating medium, whether it be lever weighted, spring loaded, or pilot controlled, to actuate against this decreased pressure and transmit the movement of the diaphragm, through the valve stem to the valves, allowing them to open further, thereby increasing the load delivered through the regulator.

The reverse is true when increased pressures on the downstream line are transmitted through the equalizing pipe to the under side of the diaphragm, tending to raise the diaphragm against the actuating pressure exerted by the weights, springs, etc.; this upward movement tends to close the regulating valves, decreasing the flow of gas and further reducing the pressure to the desired limits to which the regulator is set. In this manner, we consequently can load the one side of the diaphragm to a pre-determined point and the force exerted by the opposing load will adjust itself to open or close the regulator valve according to the flow pressure required. Consequently, on these types of regulators when we want a higher outlet pressure we naturally add either additional weights, or screw down on the spring, or increase the pilot regulator's feed to the top side of the diaphragm when a gaseous medium is used to exert a definite opposed load.

The best results are not always obtained with the use of this static line placed in the body of the regulator in that expansion pressures and turbulence are still prevalent on extremely high rates of flow at the point in the casting at which this line is taken off, and therefore a false condition is transmitted to the under side of the diaphragm, which sometimes tends to give pulsation and fluttering. However, this point of take-off is extremely convenient when regulators go into service on isolated installations and tools are not handy, so that an equalizing tap can be made into the lower pressure pipe line, without causing a lot of inconvenience. But where a construction crew is working and welders are available, and necessary tools are handy, without a doubt the best results are obtained when the equalizing line is placed downstream and away from the regulator body and at some convenient point where possibilities are that turbulence has been eliminated, or reduced to its minimum, and stream flow returned. An extended static line also helps lead the regulator when same is discharging into a larger line or header, in that as variations in flow conditions occur the downstream header feels the effect of the changed pressure condition before it is transmitted through the discharge line of the regulator, and the diaphragm being connected directly to the extended static line has already started to open or close, as the case may be, in anticipation of the changed load.

Sometimes the hydraulic head principle is employed where using pilot controlled regulators and where flows vary over a wide range, and at times the valves of the regulator operate very close to the seat. Where the valves operate close to the seat (sometimes they are practically closed with the exception of a slight creepage), the characteristic of some regulators is to pump slowly where discharging into large outlet reservoirs, which pumping tendency gives very irregular pressure charts. To eliminate this, the top diaphragm section of the regulator is filled with water and a reservoir attached directly above the head and connected to same through ⅜ or ½-in. pipe having a valve between the top diaphragm chamber and the bottom of the reservoir for throttling action. The reservoir is usually kept about half full of water, and to eliminate evaporation as much as possible, an oil seal is placed at the top of the water, of about ½- to 1-in. depth. The outlet of the pilot regulator is connected to the top portion of the liquid reservoir, and the controlled pressure actuates on the liquid head in the reservoir, exerting an upward or downward movement as the case may be, against the top of the diaphragm, causing movement of the regulator mechanism either to open further or close, and removing to a great extent the elasticity of the diaphragm which enables the regulator to hold constant steady valve motion, thus insuring a fairly uniform chart record. Sometimes glycerine is used on top of the water instead of oil. Water deteriorates the diaphragm slower than oils, and consequently is a better medium to use. The reservoir is made from 6- or 8-in. pipe about 8 in. long, having welded ends; ⅜- or ½-in. nipples are welded in the center of each end, and another vent nipple

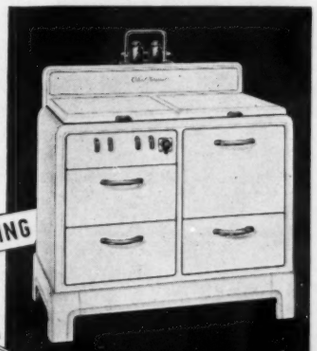
UNIVERSAL *Promotes*

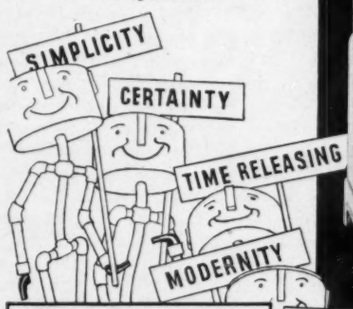


•MEDFORD Universal is a six-burner range, equipped with two ovens and an In-A-Drawer Broiling Compartment.

•MANCHESTER Universal is a six-burner range, equipped with a large bake oven and elevated In-A-Drawer Broiling Compartment.

•OXFORD Universal is a cast frame four-burner range with an 18-inch oven and In-A-Drawer Broiling Compartment.





THE HIGHEST STANDARD OF GAS SERVICE EVERY STEP OF THE WAY

• The gas range, to a greater extent than any other factor, determines the standard of gas service in the home.

If the gas range is obsolete, the gas service is obsolete. The Homemaker's conception of gas service is based on her own experience, and daily use of an obsolete range naturally leads her to believe that gas is not the most modern fuel obtainable.

The Universal Gas Range modernizes gas service in the home. It brings to the Homemaker an entirely new conception as to the convenience, the economy, the simplicity and the certainty of gas for cooking purposes.

Universal presents a complete line of modern gas cooking appliances—each range designed to meet a particular requirement and each range, regardless of its size, promotes the highest standard of gas service in such a manner as to definitely sell the consumer the fact that gas is the ideal and preferred cooking fuel.

The Intangibles ARE ON THE MARCH

Outstanding sales success today goes to that appliance which best appeals and caters to the interests of the consumer.

The Universal Gas Range permits of a sales presentation based on those intangibles that have the greatest appeal to the interests of the Homemaker, which in brief, can be translated into the promotion not only of the highest standard of gas service and cooking performance, but also the promotion of the woman's interest.

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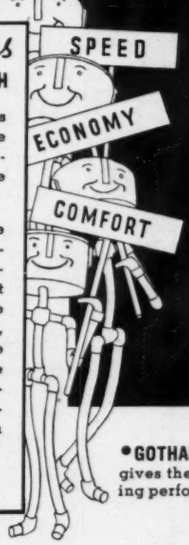


•GOTHAM Universal is a unit that gives the highest standard of cooking performance, yet fits into a space 21 inches wide.

•WHITEHALL Universal is a four-burner range, embodying every feature of the ultra-modern range at low cost.

•MARLBORO Universal is a four-burner range, equipped with large baking oven and In-A-Drawer Broiling Compartment.

UNIVERSAL *Gas Ranges*

MANUFACTURED BY CRIBBEN & SEXTON COMPANY, 700 N. SACRAMENTO BLVD., CHICAGO, ILLINOIS

is welded close to the edge on the top end.

The vent for the pilot regulator can be taken out through the top of the reservoir. The needle valve placed between the top diaphragm chamber and the liquid reservoir can be adjusted so that the regulator does not become too sluggish or too sensitive in its rise and fall with the liquid head that is actuated from the pressure change due to pilot regulator control. This means of eliminating pulsation, however, can be employed only on high pressure types of regulators where composition diaphragms are employed, and extreme areas are not encountered. This system does not work very well on low pressure regulators having large diaphragm areas and employing leather diaphragms.

Another type of pressure loading principle is being used more and more, especially when controlling extremely high pressures. This instrument is known as a pressure controller, and the different principles employed usually involve use of butterfly valves, movable pistons or rotary blocks, applying a control pressure from the instrument as desired to the master regulator diaphragm, and holding same to deliver pre-determined volumes or pressure as required. More sensitive control is obtained because in this type of instrument the diaphragm heads can operate at much lower pressures, and instead of having to use an extremely small diaphragm for controlling these high pressures, a medium-sized diaphragm may be used, giving much more sensitive control.

Back Pressure Regulators are exactly the same as reducing regulators, except that the valves are reversed and the equalizing line is taken from the high side or upstream side of the regulator, whereas the reducing regulator's equalizing line is always taken from the low side or downstream side of the regulator. It therefore follows that when the upstream pressure comes to a point where it offsets the applied opposing pressure bearing down on the diaphragm from the top side, the increased pressure offsets this applied pressure and causes the diaphragm to raise upward, carrying the valve along with it, permitting the escape of gas from the high pressure side of the regulator to the low pressure side of the regulator. Consequently, as soon as the upstream pressure diminishes to a point where the applied pressure on top of the diaphragm overcomes the diminished upstream pressure, the diaphragm moves downward and carries the valves with it to a closed position and prevents the escape of any further fluid.

Back pressure regulators are employed mostly as a medium for controlling the possibility of excess pressures being built up in distribution lines during off-peak loads; and also to automatically feed into gas holders during these off peak load periods. Numerous oil companies use these devices for holding back pressure on their separating traps, which assures the operation of a well at constant, uniform pressure, excess gas being relieved from the traps as the wells continue to produce. The gas relieved in this manner can be taken into a gathering pipe line system for utilization, or a high pressure regulator can be connected to a stack line discharging gas to the air. Gasoline plants employ numerous back preessure regulators for holding constant pressure on stills and absorption towers. On main transmission lines they are sometimes employed to act as pop safety valves, that is, as the pressure on the main line becomes too high the back pressure regulator relieves excess pressure to atmosphere, or if a lower pressure line is handy a tie-over is made where the excess gas above the pre-determined set pressure passes through the back pressure regulator into the low pressure line. With the exception as explained above, all other operations and mechanics of this regulator are the same as the reducing type of regulator.

Low Pressure Balanced Valve Regulators also employ practically the same principle as the high pressure regulators already described, except that they have the much larger diaphragm chambers necessary to give the best possible control, as they are operating larger valves than are commonly found in the high pressure regulators. These low pressure units are actuated principally by the use of dead weights applied directly to the top of the diaphragm, and are extremely sensitive and produce the necessary uniformity of control required for this type of service. Employing the dead weight principle the weights can either be installed directly on the diaphragm or inside the top cover as mentioned above, where same can be sealed completely and installed in vaults or pits, and when vented above ground will actually work under water when these vaults or pits become flooded. Of course, with this type of installation it is somewhat harder to change pressures as the top must be removed to increase or decrease the amount of weights required. However, where regulators are installed above ground, or the regulator pit or vault is kept dry, a diaphragm stem extension can be used, which would carry the weights on the outside of the diaphragm head casting. The manner of loading in this way is quite simple, as all the weights are then exposed, and pressure adjustments can be made very easily.

■ ■

Taylor Heads Program at S. C. M. A. Meeting

AT the regular monthly meeting of the Southern California Meter Association on August 27 at the Van Matre Inn, Huntington Park, Calif., J. B. Taylor of the Signal Oil and Gas Co. gave a paper on the "Measurement of Gas under Vacuum." Discussion on the paper which dealt with methods of sampling, checking meters, etc., was led by J. A. Smith of the Texas Co. and C. B. Heartwell of Standard Gasoline. As a second feature of the program, a talking motion picture, "The Big Job" depicting the accomplishment of bringing the Colorado River water through the mountains and across the desert to Southern California, was presented by a representative from the Metropolitan Water District.

■ ■

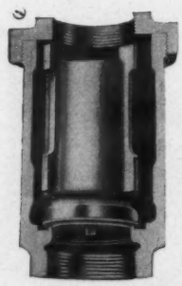
Munroe, Sales Director

Roy B. Munroe, at one time engineer in the new business department of the Kansas City Gas Co., and since 1933 sales supervisor and house heating engineer with the Peoples Gas Light and Coke Co., Chicago, has recently been appointed a sales director.

Blows at any desired pressure giving Sure Protection

Lever Type

C-F SAFETY VALVE



Dead Weight Type

FOR any pressure between 5 and 100 pounds, the lever-type safety valve here illustrated is suitable. Below 5 pounds, C-F dead-weight safety valves are recommended. These valves never stick, never fail. Of superior design and workmanship, they have been proven by many years of service. The lever-type safety valve is especially adapted for use between the high-pressure and low pressure regulators of a low-pressure distribution system. Write for full information concerning safety valves and other requirements for gas control.

THE CHAPLIN-FULTON MFG. COMPANY

28-40 Penn Avenue **Pittsburgh, Pa.**

REPRESENTATIVES:

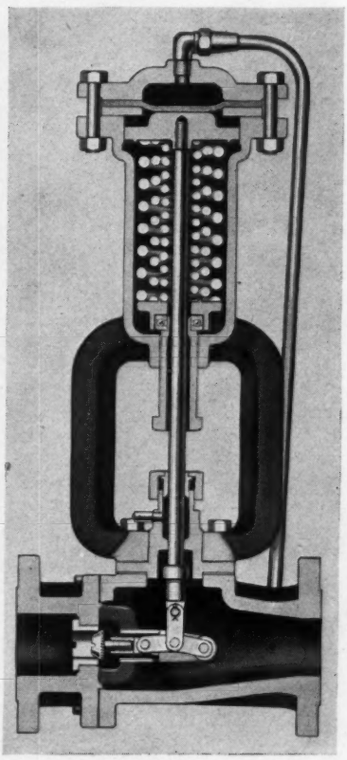
WESTCOTT & GREIS, INC.
Sales and Service
Dallas—Tulsa

or any jobber

HIMELBLAU, BYFIELD & CO.
36 S. Throop St.,
Chicago, Ill.

HIGH PRESSURE

SAFE AT ONE TON



Reynolds New High Pressure Regulator for safe handling of Ton Pressures.

REYNOLDS High Pressure Regulators from one ton on down are factory tested through a range of operating conditions that will not be met ordinarily in routine operation. Ample safety factors—the all-important consideration in every high pressure installation—are provided in the REYNOLDS Regulators.

Safety, economy and efficiency are the time-tested performance factors that conclusively prove Reynolds superiority in proper gas regulation . . . the records of thousands of installations further confirm it!

Write to the Engineering Department at the factory, or to your nearest representative or branch office for complete details.

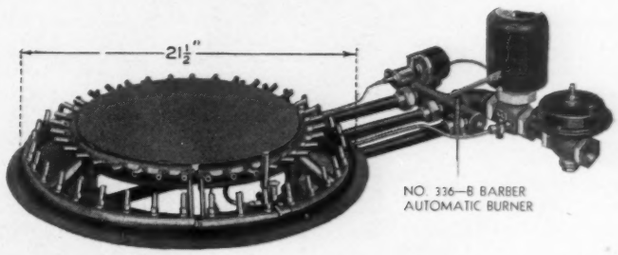
REYNOLDS GAS REGULATOR CO.
Anderson, Indiana
U. S. A.

Reynolds Branch Offices:
421 Dwight Bldg.
Kansas City, Missouri
2nd Unit, Santa Fe Bldg.
Dallas, Texas

Representatives:
Eastern Appliance Co.
Boston, Mass.
F. E. Newberry
Avon, New Jersey

GAS CONTROL SINCE 1892

What BARBER BURNER "LEADERSHIP" *Means to YOU*



NO. 336—B BARBER AUTOMATIC BURNER

THE impressive record of Barber Automatic Gas Conversion Burners covers a period of over 18 years. You are interested in "clean" sales—without frequent servicing and removals. Your customers insist on ***trouble-free*** heating and ***sensible*** fuel costs. If you are financing time payment sales, you want collections that come in without difficulty. By unquestionably better performance, Barber Burners have won the support of discriminating Gas Appliance Manufacturers and alert Heating Dealers everywhere.

- Eight "tailor-made" sizes to accommodate round grate diameters from 12" to 34". Also "tailor-made" to SUIT and FIT the grate dimensions of oblong furnaces or boilers.
- Insure a "scrubbing" flame action on side walls of firebox, at the proper level, with 1900° Fahrenheit flame temperature.
- No fire brick or refractory elements needed to deflect the flame to the side-walls.
- Barber Burners require only 70% of the installation time of burners using refractories.
- Equipped with the improved Barber vacuum-principle noiseless jets, unequalled for air-mixing efficiency, unaffected by dirt, corrosion or condensation.
- Furnished with "Baltimore" or Klixon" Safety Pilot Control—positive and accurate.
- Listed in the A. G. A. Directory of Approved Appliances.

We supply Sales Literature, Specification Data Sheets and Practical Sales Assistance. Write at once for our NEW Illustrated Catalog No. 37 and Revised Price List.

THE BARBER GAS BURNER CO.
3704 Superior Ave. Cleveland, Ohio

Address Michigan Inquiries to

THE BARBER GAS BURNER COMPANY OF MICHIGAN
4475 Cass Ave., Detroit, Mich.

BARBER *Automatic* JET GAS BURNERS

for Warm Air Furnaces, Steam and Hot Water Boilers

and Numerous Other Heating Appliances

"Salesville" Election Campaign Brings New Business to Wisconsin Corp.

By F. J. HATCH

Publicity Director, Wisconsin Public Service Corporation

NOT only a "chicken in every pot" but also a modern gas range to cook it on and a gas or electric refrigerator to keep it in was the main platform plank of the candidates for Mayor of Salesville, in a sales contest which was recently conducted in the Eastern Division of the Wisconsin Public Service Corp., Milwaukee, Wis.

A. C. DAVEY

Because 1936 is the presidential election year many people believe that "business will be unstable." A. C. Davey, new business manager of the Wisconsin Public Service Corp. decided that the first sales campaign staged this year would be one to knock this traditional superstition into the proverbial cocked hat.

At the annual spring salesmen's conference Mr. Davey announced to his sales organization a plan to elect a mayor and aldermen of Salesville. All individual salesmen were competing for the honor of refrigerator or range alderman, the winners being the two highest gas range salesmen and the two highest refrigerator salesmen. The five divisional commercial managers competed for the honor and office of Mayor of Salesville. An election campaign prospectus was presented at this meeting and a slogan adopted, "Every sale means votes—Every salesman a vote getter."

The candidates for office of mayor presented their platform on cards typical of regular elections. The planks ranged from "Bigger and better meals" to "More Irish policemen." The back of the election cards contained the voting data which gave complete information about the sale and recorded the value of the sale in votes.

In order to include as much new business in the campaign as possible, it was decided that a range or refrigerator sold to a new user be equivalent to four votes, a replacement sale two votes and an employee sale one vote. In this manner most of the salesmen's time would be expended on new business, most profitable to himself as well as to the company.

Attractive terms including a small down payment and extended payment plan were put into effect during the campaign. Load-building bonuses were offered and a special campaign prize of $70 in cash was awarded to the commercial manager who won the honor of being Mayor of Salesville. The runner-up received $30 in cash. The two range aldermen received the first prize of $20 and the second prize of $10. Likewise the refrigerator aldermen received the $20 first prize and $10 second prize. In order to speed up the contest a special prize of $15 went to the salesman who reached his quota first. An additional $15 prize was also given to the refrigerator salesman first reaching his quota. So keen was the competition for this last prize the winning salesmen found it necessary to wire the divisional headquarters immediately following the sale that completed their quota.

The company acquainted all dealers with the campaign plans. In order to encourage their participation the company agreed to carry dealers' accounts on sales made in accordance with the requirements set forth by the company. Other assistance such as installations, credit ratings and advertising literature was also furnished the dealers.

The campaign extended from February 11 to March 28, producing a sale of 370 units of which 312 were gas ranges. Out of the total of 312 ranges, 130, or 42 per cent of the total ranges, were sold to new gas-using customers. This is the highest number of gas ranges sold to new users ever achieved in any like campaign. In refrigeration, 58 refrigerators were sold, 36 electric and 22 gas. This was considered a very good showing because the campaign was conducted in the cold winter months. The total merchandise value of the activity was upwards of $29,000.

C. A. "Buster" Debell, Sheboygan district commercial manager, was elected Mayor of Salesville with the most outstanding record in his division.

That the campaign proved to be successful throughout the company is evidenced by the fact that five salesmen of the Wisconsin Public Service Corp. were national winners in the National Gas Range Sales Contest during the month of March. (*GAS*, July, Pg. 32).

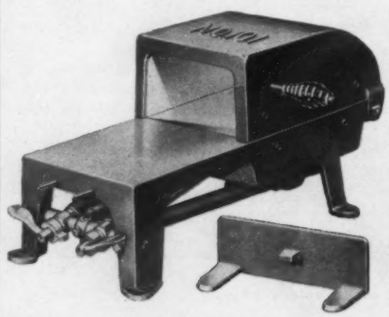
The campaign produced a tremendous amount of good-natured rivalry and enthusiasm throughout the property, which proved to be an effective stimulus for the entire organization. Dealer sales were considerably increased during the month and the employees throughout the company took an active part in the program.

■ ■

Ore. Gas Appliance Group Elects Officers

The Gas Appliance Society of Oregon at its second annual meeting in Portland last month elected Fred Chess, president of the Chess Plumbing and Heating Co. president for the coming year. Mr. Chess succeeds J. H. Anderson of the Powers Furniture Co. Tracy Simpson of the James Graham Manufacturing Co. was named vice-president, and Walter J. Widmer of the Widmer Plumbing and Heating Co. was reelected treasurer.

Due to the increasing popularity of modern gas appliances, membership in the society has doubled during the past year, according to a report by J. King Byron, managing director of the society.



JOHNSON
NO. 101
BENCH FURNACE

A big market exists for this popular bench furnace. In factories and industrial plants, the Johnson No. 101 Bench Furnace performs efficiently and economically, day after day. Heats soldering coppers up to 12 lbs. per pair. Heat-treats, tempers, anneals, or case hardens carbon steel tools or small metal parts. No forced air blast, required. Write for free catalogue.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Western Representative:
C. B. BABCOCK CO.
135 Bluxome Street
San Francisco, Calif.

Eastern Representative:
J. H. McPHERSON
250 Stuart Street
Boston, Mass.

AIR CONDITIONING
Electrogas
HEATING EQUIPMENT

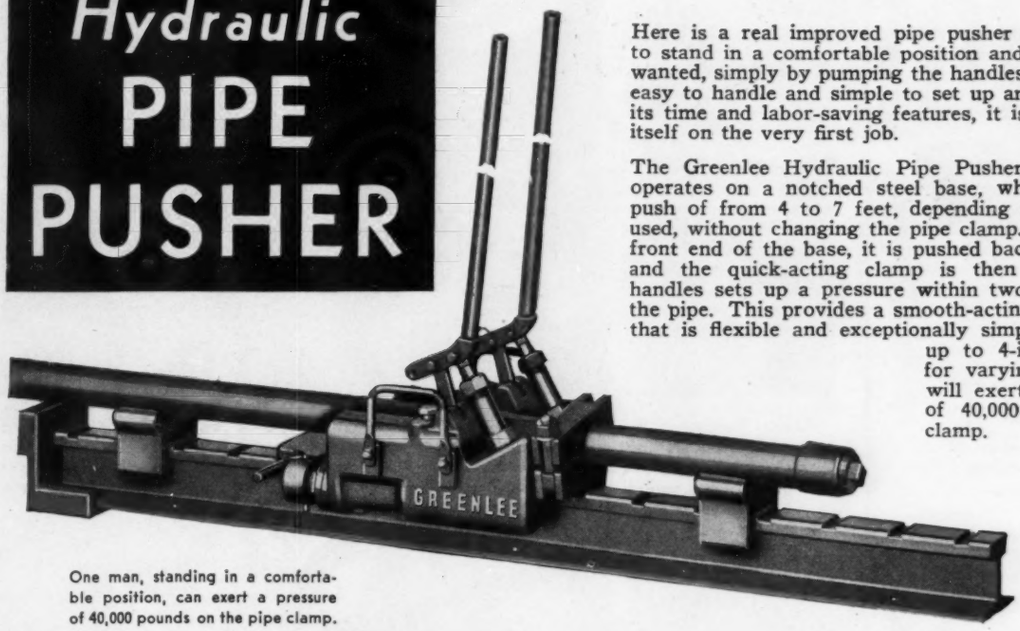
FURNACES BLOWERS FILTERS WASHERS

Write for attractive Dealer proposition

ELECTROGAS FURNACE & MANUFACTURING CO.
2575 Bayshore Boulevard, San Francisco

GREENLEE *Hydraulic* PIPE PUSHER

Push Pipe the Greenlee Way . . .
Faster . . . Easier . . . Cheaper



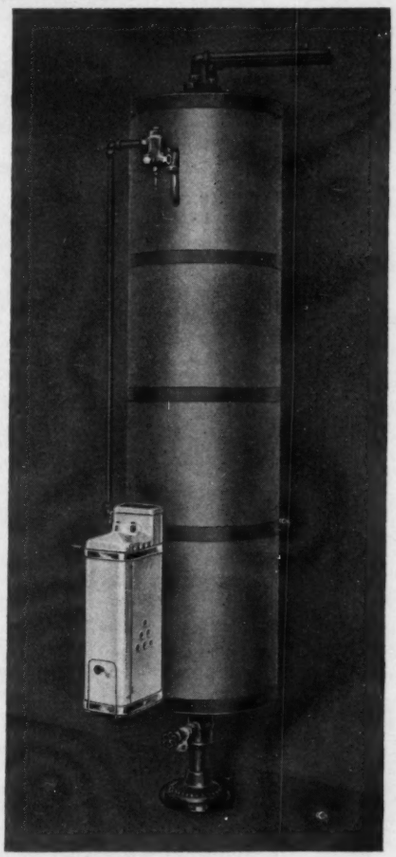
One man, standing in a comfortable position, can exert a pressure of 40,000 pounds on the pipe clamp.

Here is a real improved pipe pusher that permits one man to stand in a comfortable position and send pipe where it is wanted, simply by pumping the handles. It is compactly built, easy to handle and simple to set up and operate. Because of its time and labor-saving features, it is often able to pay for itself on the very first job.

The Greenlee Hydraulic Pipe Pusher is self-contained. It operates on a notched steel base, which permits making a push of from 4 to 7 feet, depending on the length of base used, without changing the pipe clamp. When it reaches the front end of the base, it is pushed back to the opposite end, and the quick-acting clamp is then reset. Pumping the handles sets up a pressure within two oil cylinders to push the pipe. This provides a smooth-acting, powerful mechanism that is flexible and exceptionally simple. It will push pipe up to 4-inch, has eight speeds for varying soil conditions and will exert a maximum pressure of 40,000 pounds on the pipe clamp.

WRITE TODAY for COMPLETE DETAILS

GREENLEE TOOL CO., 1700 Columbia Ave., ROCKFORD, ILLINOIS



Every tank heater home is an immediate prospect for this

HOTZONE
Welsbach
number seven
CONVERSION GAS WATER HEATER

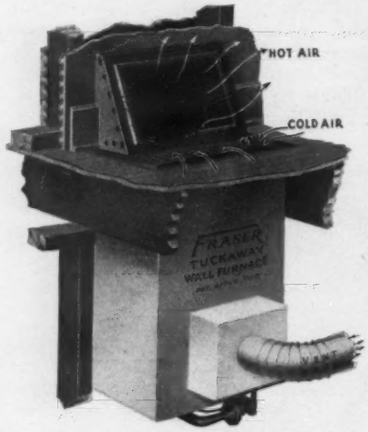
This unit turns any tank into a modern water heater—that is automatic, safe, efficient.

This heater contains a modern Welsbach automatic burner, a fully automatic thermostat control, and a water heating element incorporating an ingenious arrangement of heat absorbing surfaces.

THE RESULT: This low cost modern HOT WATER service creates hundreds of new prospects in your territory!
Write for full details today:

Welsbach COMPANY
Gloucester, N. J.
BRANCHES IN CHICAGO AND SAN FRANCISCO
Since 1887 Pioneers in the Manufacture of Gas Burning Appliances

FRASER
TUCK-A-WAY



An entirely new idea in
Furnace Construction
Made in 4 sizes

Manufactured by
Fraser Furnace Company
Stockton, Calif.
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REDUCE
Operating Cost
— WITH —
SPRAGUE
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— AND —
SPRAGUE
REGULATORS

SPRAGUE METER
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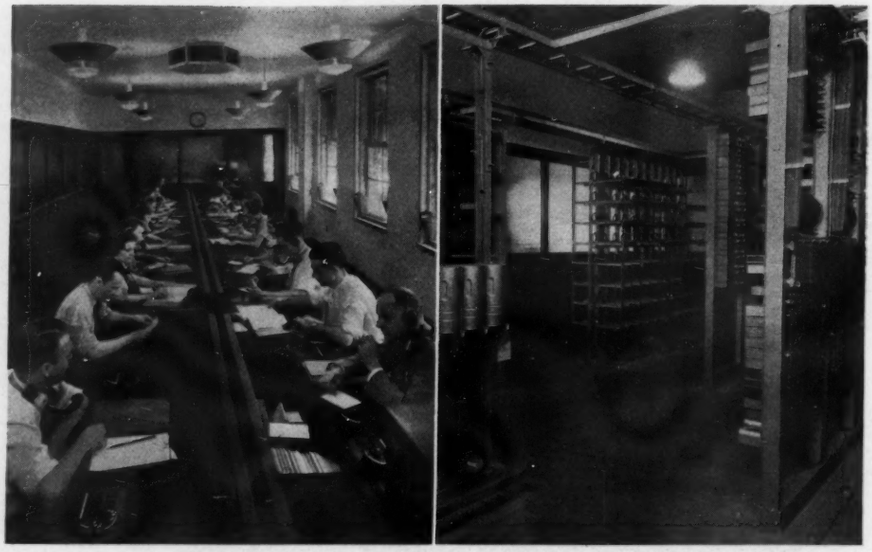

LEFT: Telephone table where all orders for service are taken, with open order desk in foreground. The narrow slot down the middle of the desk contains the belt conveyor which carries the orders from the customer representative to the open order desk. RIGHT: Section of the control room showing a part of the automatic switching mechanism of the new telephone system.

New Central Service Building of The Laclede Gas Light Co. and Laclede Power & Light Co. in St. Louis, Mo.

Laclede Gas Light Introduces New Customers' Service System

A NEW customers' service system, recently installed by the Laclede Gas Light Co., St. Louis, Mo., in a new building at 3950 Forest Park Boulevard, was placed in operation on June 15.

This new system, together with the building which houses it, cost $200,000 and will enable the company to furnish customers with the most efficient and complete service possible through modern equipment, including one of the latest telephone developments. This unique telephone system, the only one west of the Mississippi River and the second complete system of its kind in the United States, makes it possible to attend to customers' needs with greater ease, directness and dispatch than ever before in the history of the company. Customers' orders and requests pass through fewer hands, follow a more simple and direct route in process of completion, require fewer forms and involve less detail in handling.

It required about six months to erect the building, at a cost of $150,000 and several months more to construct and install the telephone equipment costing approximately $50,000. The telephone system was designed especially by engineers of the Bell Telphone Co. for handling all telephone communications of the gas company and Laclede Power & Light Co.

In the new system, telephone calls from the public are brought in over two groups of lines. The telephone directory now shows two numbers, one for service and one for administrative purposes. The service number is answered directly by a trained customer contact representative. The call passes through an automatic switching device eliminating manual telephone operators. These customer contact representatives can make direct connection with any department of the company without going through a manually operated switchboard. With this system, the customer

DON'T GRUMBLE ABOUT RISING PRICES

Stop them

During last two years... Rent up 15%... Food up 37%... Clothes up 22%—WHY?

Why do prices go up?

Here's one reason everybody can understand. Taxes are added into your rent. They're a big slice of your gas and electric bill. Gasoline averages 40% taxes. 53 taxes go into a loaf of bread. Everything you buy is a tax collector. Therefore prices go up when taxes go up.

Government spending now equals almost 1/3 of our national income!

Many government expenses are worthwhile. But probably a third of what national, state and local governments spend is wasted. That's five billion dollars, $166.00 for each family in America. If we don't *do something*, where will the waste stop? Ten billions? Twenty billions?

Don't blame the landlord and the grocer for the high cost of living. It's your own fault. Only you can stop government waste and promote economical, efficient government. This is how to do it; *take these two steps now:*

1. Make this resolution: "I will support no candidate who cannot prove that he has used all his influence to reduce government expenditures."
2. Write three letters. One to your Mayor, or County Clerk, one to your Governor, one to the President. Say: "*I want the cost of government reduced*," and sign your name.

There are forty millions of us, working to pay for local, state and federal government. It's up to us to insist that the government watch its expenses as carefully as we do ours. After all, it's our money the tax wasters are spending.

DO YOUR PART TO BRING BACK ECONOMY IN GOVERNMENT

Register . . . Vote . . . Replace the wasters with lawmakers who will SAVE public money.

Space for this message is provided by GAS
because of a firm conviction that a reduced cost of government is vital to the interests of all its readers.

has to tell his story only once; the first voice the customer hears follows through to the completion of the inquiry; attention is given at all times during the transaction; there is no waiting, no transfers, no "hanging" on a silent line. The customer at all times may "listen in" on the conversation between the employees in the different departments when information from other departments is necessary.

The equipment is so designed that all calls will be answered in the order in which they are received, including inquiries in connection with bills or accounts, trouble, repairs and all work necessary for gas and electric service.

All service orders are received at the order receiving section consisting of two long tables with 18 opeators, nine on each side. Down the center of the table is a V-belt conveyor leading to an open order desk. When the telephone transaction with the customer is completed, and all necessary information received, the customer contact representative fills out an order blank in duplicate. The order is then dropped in the belt conveyor which carries it to the open order desk where it is checked for accuracy of name, address and other essential information.

The duplicate is filed in this desk as a record, pending the completion of the order, and the original is sent to the field as an order for the work to be done. When the work has been completed, the original is returned to the open order desk to be checked against the duplicate in the file to verify the accuracy of the field work.

The system required the rearrangement of equipment, changing of records and the installation of a large number of telephone lines in the various departments of the company in order that information may be obtained without delay.

The new central service station also consolidates the distribution and drafting department officials who supervise the installation of mains, services, meters, appliances and the like. Heretofore, these departments have been located in various parts of the city, and through a centralization of these activities, delays in the execution of orders of customers will be avoided. The general storeroom also is located in the central service station and all materials and supplies, used in carrying out orders, will be distributed from this building.

In connection with the new system there has been stationed in the general office building, at Eleventh and Olive Streets, a number of specially trained employees known as "customers' advisers." These employees are located on the main floor where they will receive and handle all matters pertaining to applications, adjustments, credit and the like. These employees, operating at desks, will have telephone connections with all departments, and customers visiting the office can have transactions completed without visiting any other department.

By-product Used in Plant Pest Control

SIX tons of a sulphur product highly effective in combating garden and orchard pests is being turned out daily by the new sulphur recovery plant established by the Portland Gas & Coke Co., following the development of a successful method of reclaiming microscopic particles of chemical sulphur from discarded gas filtering materials. The Portland plant is the only one on the Pacific coast now producing chemical sulphur as a by-product of gas.

Known by the trade name "Microsulfur", this new by-product can be produced at a cost comparable to that of commercial sulphur. These chemically deposited particles of sulphur, which are too fine to be measured by ordinary methods, are said to be more effective than ground or sublimed sulphur in the control of mildew, brown rot, apple scab, rust, and other pests. Heretofore the cost of chemical sulphur has prevented its general use for horticultural purposes.

Ground commercial sulphur for horticultural dusting is classified according to the screen through which it will pass. Commonly required is a sulphur that will pass through a 325-mesh screen. The new "Microsulfur" product is about five times as fine as very finely ground commercial sulphur, and would pass through a 1666-mesh screen if it were possible to make so fine a screen.

With approximately 10,000 tons of sulphur now on hand, the recovery plant can operate at full capacity, 24 hours a day, for five years. Distribution of "Microsulfur" will be handled by established dealers.

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Mississippi Power Campaign Exceeds Quota by 165%

Final returns on the "Happy Homer" sales campaign of the Mississippi Power & Light Co., Jackson, Miss., resulted in the overwhelming election of "Happy Homer", symbolic representation of home utility appliance modernization, over "Old Man Quota", who was badly beaten when company-dealers sales efforts registered 165 per cent of quota. State totals on company-dealer sales of gas appliances were ranges, 980; automatic water heaters, 317; tank water heaters, 215. The sales election was a feature of the company's thee-month's Convention of Happiness (reviewed in the July issue of *GAS*), which promoted popular knowledge on modern cooking and heating methods by demonstrations and advertising throughout the area served by the utility.

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Indianapolis Gas and Coke Buys Equipment

Citizens Gas and Coke Utility, municipally-owned plant at Indianapolis, Ind., has purchased $585,000 worth of water gas machines and auxiliary equipment, according to an announcement by Thomas L. Kemp, general manager of the organization. Contracts were let to the Koppers Construction Co., Pittsburgh, Pa.

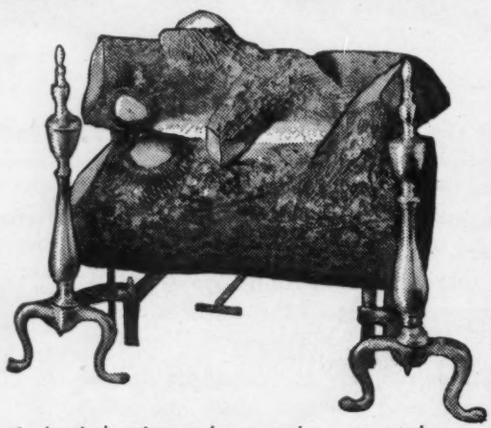
YOURS TO BE HAD!

New Load from The Fireplace

Long neglected, the fireplace comes into its own for LOAD BUILDING

Add Millions

of B.t.u.'s to your lines with GLO-FIRE, the odorless, and approved GAS LOG. Designed to add beauty and charm to any room.



Recognized as the most efficient and realistic GAS LOG made!

A circulating heater for vented or unvented fireplaces, equipped with venturi type burner. 28,000 B.t.u. hourly input

Write for Information Today

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National Distributors
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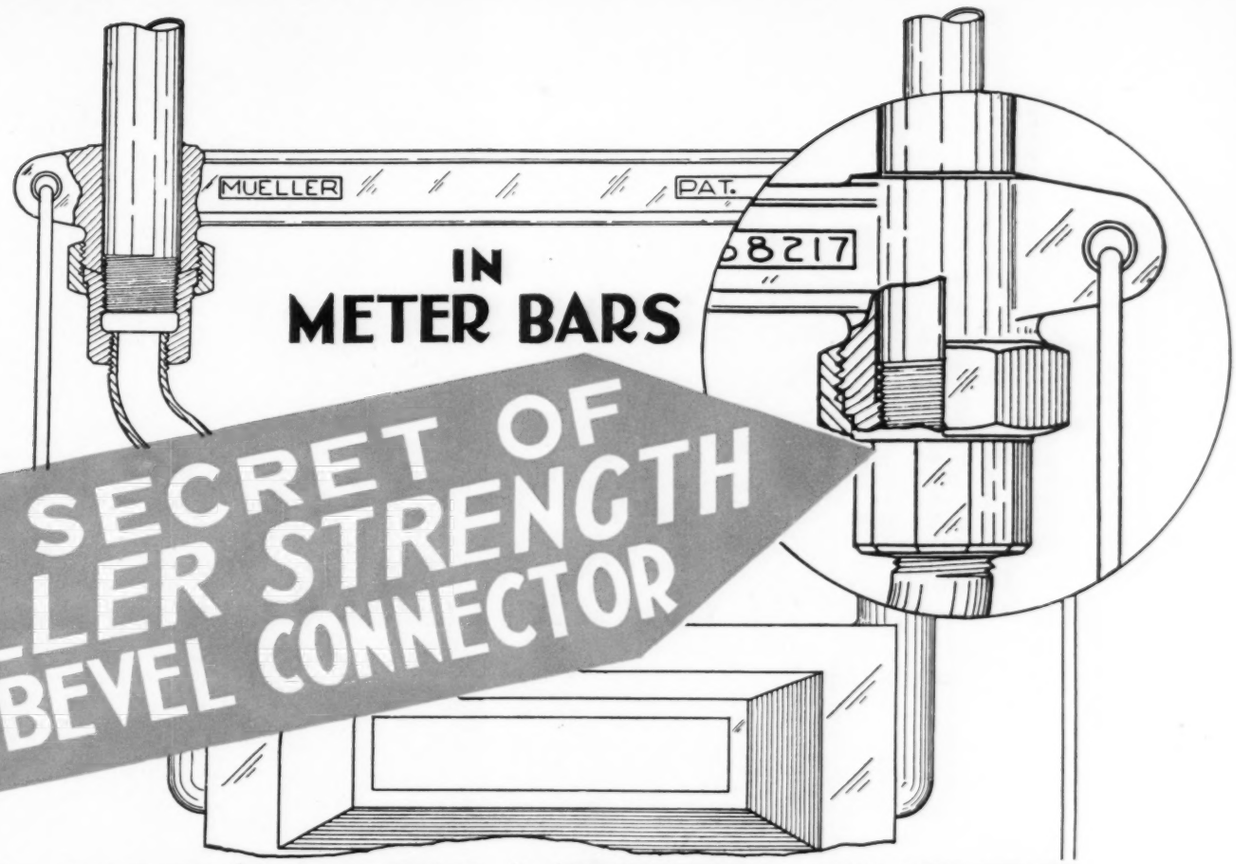


IN METER BARS

THE SECRET OF MUELLER STRENGTH IS THE BEVEL CONNECTOR

NO STRAIN ON METER TUBES

..PERFECT ALIGNMENT

The bevel connector of this new type MUELLER Meter Connection is a special reducing coupling which serves to connect supply and outlet pipes to swivels. It also controls their relative positions by attachment to an accurately machined rigid cast iron bar. This permanently locates and aligns meter end of swivels so that no strain is transmitted to meter tubes.

A long close fitting socket is provided in the bar which forces the supply and outlet pipes into axial alignment for attachment to the bevel connectors. This also braces the weakest part of the pipe and protects the threads from rust. A strong malleable nut pulls the bevel face of the connector in solid contact with a similar bevel face on the bar which completes the alignment and permanently locates the connectors and swivels. This makes a firm rigid connection which protects the meter from any strain that may result from settling or shifting of pipes. There are only two threaded connections on each end with no union gasket joints. Bar may be used as a template to cut and thread vertical pipes the proper length. These Meter Connections are made in various designs to meet any piping conditions.

THERE IS A MUELLER METER BAR FOR EVERY TYPE OF INSTALLATION

MUELLER CO.

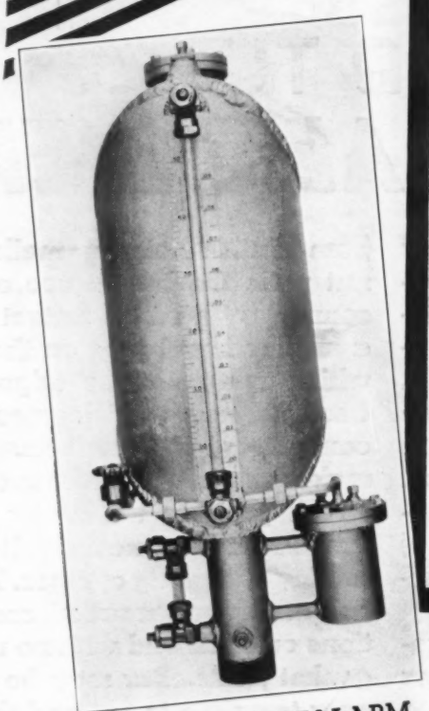
DECATUR, ILLINOIS

PENTALARM

THE WARNING ODOR FOR FUEL GASES

The larger distributors of natural gas have found PENTALARM to be the most satisfactory, efficient odorant for both continuous and intensive odorization. Mixed with the gas in pipelines and mains, PENTALARM warns instantly by its penetrating and unmistakable odor. Repair men are guided accurately to the point of danger—costly leaks and hazards to life and property are promptly removed.

Only a small volume of PENTALARM—shipped as needed—is required even by the largest systems. Storage is thereby eliminated. Facts and figures on PENTALARM and Pentalarm Odorizing Equipment will be forwarded on request.



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Pentalarm Your Pipelines!

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